

SUPPLEMENT.



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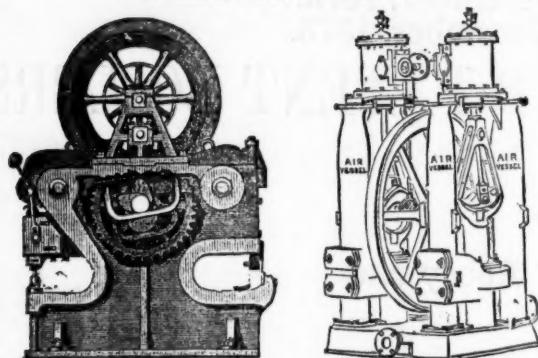
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LONDON, SATURDAY, DECEMBER 12, 1874.

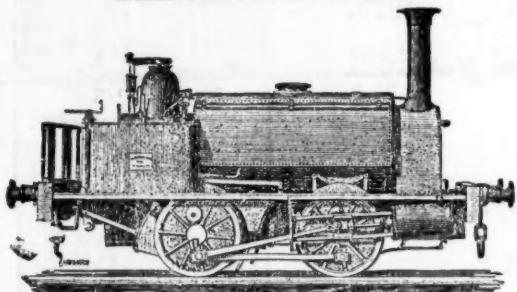
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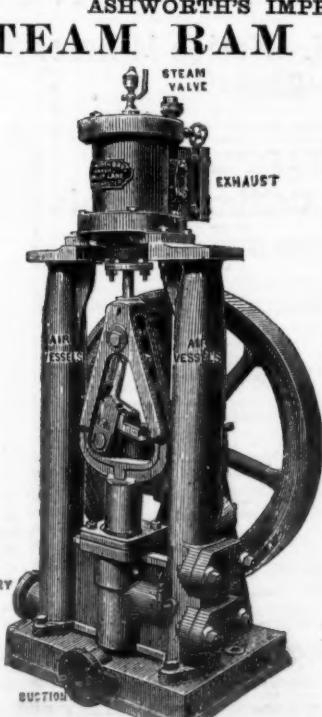
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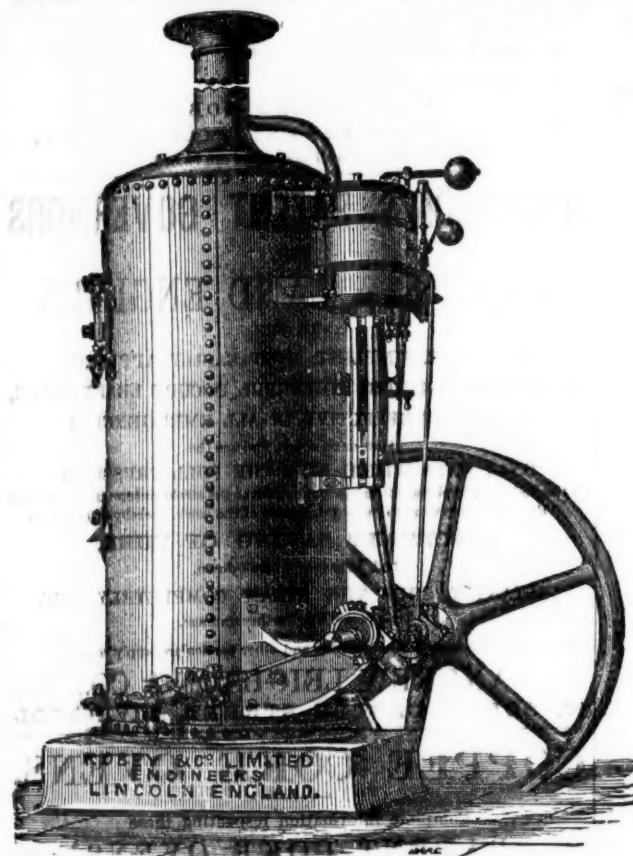
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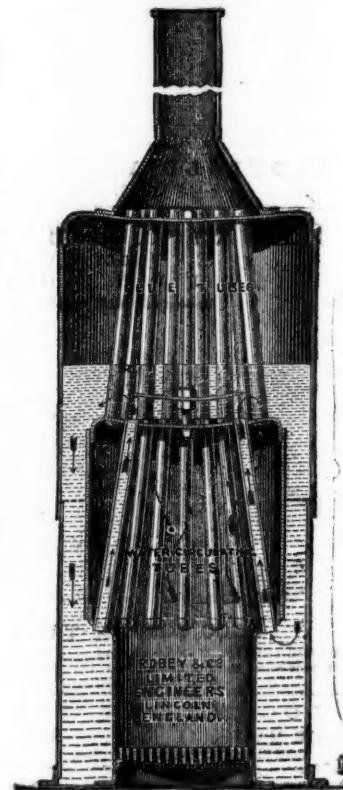
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Original Correspondence.

CO-OPERATIVE COLLIERIES.

SIR.—The problem whether collieries can be worked on the co-operative principle is now in a fair way for solution. There are now at least half-a-dozen companies, or rather societies, formed by working miners, the sole object of which is to try the experiment. These are—the Co-operative Mining Society of Newcastle, the Manchester Coal Mining Society, the Leeds, Morley, and District Mining Society, the South Buckley (Cheshire) Colliery, the North Staffordshire Co-operative Mining Company, and Henry Briggs and Son, of Methley, near Normanton. In the case of the Methley Collieries, they are owned by Messrs. Briggs and Son, who have, however, adopted the co-operative principle, taking only from the profits a percentage fixed beforehand upon the capital, and dividing the residue amongst themselves, their workmen, and their customers. The effect of this arrangement has been to obtain for them a market for the whole of their output amongst the surrounding distributive stores. A recent visit to the great co-operative centres of the North has yielded a good deal of information on this movement as regards coal and iron mining. The working men of the North have discovered that if, as the political economists say, capital is useless without labour, so labour is impotent for any great enterprise without capital, and they have devoted their savings to supply the requisite capital. Their own deposits have been largely supplemented by loans from the co-operative stores, which in the populous towns and villages have in a great number of instances accumulated from profits far more capital than is needed for their trade. At the present moment, therefore, it is not capital that is wanting, but the acquisition of suitable collieries or ironstone mines for its employment. Several causes have increased this difficulty. In some cases the prejudices of proprietors against co-operation have intervened. The extremely high prices obtained for coal, which to some extent suggested to the leading minds amongst the co-operators this field for the development of their energies, has naturally enhanced the first cost of coal fields, of shafts, and of plant; and the managers of the infant companies have been unwilling to overweight their speculations by paying too much for leases or royalties. This difficulty has been surmounted in most cases, and notably by the Co-operative Mining Society of Newcastle. This body started into existence, as it were, with a stamp of the foot. A number of delegates from the Northumbrian miners had assembled at Newcastle to discuss some questions respecting the strikes going on in the autumn of 1872; and having disposed of the points immediately referred to them, an informal conversation arose, in which it was suggested to form a coal mining society on the co-operative principle. There was doubtless a great deal of "tall talk" about colliers being their own employers, and working in their own mines, but the idea took a practical shape, and in a very short time afterwards the prospectuses were issued, 1200 shares taken, and 1*l.* deposit on each was paid down. At the present moment there are double that number of members who are working miners. After a time the new society obtained a lease of the Monkwood Collieries, near Chesterfield; sufficient additional capital was furnished chiefly by the other co-operative organisations, the Durham co-operators alone investing 15,000*l.* in the venture, and the work was commenced on a purely co-operative system. In the first place, it is indispensable that every person employed must be a shareholder, and so have a direct interest as a capitalist in its success. If anyone is not in that position previously he must become so by consenting to the deduction of a portion of his wages every pay-day to grow into share capital. The work itself is conducted just like any other well-ordered colliery in the district. There are the chief viewer, the under viewer and overman, the fireman, the hewers, putters, and so on below; and at the surface the ordinary banksmen, screeners, engineers, clerks, and business managers. The seam is about 4 ft. thick, the coal is what is called Sillstone of a good quality, and presents no peculiar difficulties. It is too fiery for the use of open lights, but beyond the ordinary safety-lamps no special devices to secure safety have been adopted.

After paying all the working expenses, interest on borrowed capital, and writing off a sufficient amount for depreciation and insurance, the profits are divided into three parts. First, the shareholders get 10 per cent. on their capital; the remainder is divided between the workers and the customers. The shareholders may, if they please, take their percentage; but it is found that most of them allow it to remain to increase their number of shares. The working people (whether full shareholders or not) must leave their portion of the surplus to become capital in addition to the deductions from their wages, which go in the same way. The customers, in the first instance, are the co-operative distributive societies, but the real customers are the consumers; and in order to let the latter obtain their share of the profits, all purchasers get back again so much for every ton purchased. This, it may be said, is discount under another name; but it is not taken off the price of the coal, which follows the ordinary markets, and is paid like a bank dividend at fixed periods. One reason given for adhering to this arrangement is the hope that many of the customers will leave their dividends to accumulate, and thus to become capital—a result very largely experienced in the purely distributive departments.

Amongst the other societies, we hear of the South Yorkshire having 5000 members, with 1*l.* a share paid up; and of the Leeds and district society 10,000 members. The former is about getting to work on the Barnsley coal beds; and the latter has not only a colliery near Leeds, but has invested largely in a mine at Tipton. Some of the sums mentioned as being at the disposal of the working men are startlingly large, but the wonder ceases when it is remembered that the disposable net profits realised last year by the co-operative stores was 807,000*l.*; and that in one town the accumulation of capital beyond the amount required to carry on the business had become no less than 7000*l.*, which, after due notice, the owners were required to withdraw, and which they would naturally invest in co-operative undertakings.

Now that co-operative collieries are multiplying in number, schemes are under discussion for some sort of federation which would prevent them competing with each other in the attainment of mines or pits, and some sort of combination between the working miners and the co-operative stores will shortly be completed.

One of the most important results expected from co-operative production is that it will put an end to strikes. In all disputes between capital and labour there is wanted some recognised standard by which fair work and a fair rate of wages can be decided. Thus, when collieries and cotton mills, and other branches of industry, are carried out by co-operation, that standard will be obtained. Whether it will be generally recognised or not is another question. When the workmen find not only the labour but the capital, then other workmen may be convinced that the rewards of each are fairly adjusted. Certainly all the working men who become co-operators are certain sooner or later to discard the theories which would give undue preference to labour, and be ready to admit the claims of capital derived from their own thrift and past labours. In short, the conflicting interests of capital and labour will not be represented by different persons. The masters in other establishments can appeal to the co-operative works as to what is the fair rate of wages. Differences will, at any rate, be more easily accommodated when the employer can refer to a rate of wages not determined arbitrarily by the capitalist class, but by workmen who are capitalists themselves as well as workers.

In the meantime no direct results with respect to strikes are likely to result at present from this movement. The workmen at the Monkwood Collieries agree not only to the fiscal arrangements, but bind themselves not to strike. The agreement is that in case of a general strike the work at Monkwood goes on as usual, and when the strike is ended the workmen have an advance if it be gained, dating from the commencement of the strike; or supposing the contest to result in a fall of wages the workmen accept the new rate of the district. Dr. Rutherford, of Newcastle, an active and educated supporter of co-operation, is sanguine that the recognition of labour, which is an essential principle in it, will gradually extinguish strikes, that it will stimulate men to do their best instead of dawdling through the hours of labour, and that it means good, honest, manly work. And

certainly, whether produced by co-operation or any other agency, that is "a consummation devoutly to be wished." C.

A MINERS' AGENT ON CO-OPERATIVE COLLIERIES.

MR. WILLIAM BROWN, of Hanley (the North Staffordshire miners' agent), on Tuesday, addressed a meeting of miners at Bedworth on the subject of co-operative collieries. Mr. Brown said he had for many years been convinced that if ever the working men of this country were to raise themselves above the level of ordinary workmen it would have to be done by co-operation. Those present were, no doubt, aware that the miners in West Yorkshire and North Staffordshire had formed a Mining and Building Society (Limited). They intended to work their own pits, get their own coal, take it to the market, and sell it to customers, thus earning for themselves something more than ordinary wages. They had been told many times by employers that they were obliged to have large profits, in order to put by annually a surplus capital, to enable them to extend their works, and meet the requirements of an increasing population. He thought the capitalists now in existence had amongst them capital enough and power enough; and if working men, without taking anything from the capitalists which they had already got, could just have confidence amongst themselves, and manliness enough amongst themselves, and could bring their minds to endure a little self-denial for a season, in order to work out for themselves a permanent future good, he was confidently of opinion that that would be the first step for the advancement of the working classes of this country. Unfortunately, every working man could not be made to see that it was right to have a co-operative colliery, and while many of them spent in other things as much as would enable them to pay for two or three shares they could not find manliness enough to take a few shares. The 1500*l.* which in his district had been paid as a deposit on a colliery had been contributed by working men alone. The Longton lodge had taken 100 shares, Burslem 50, Hanley 70, while a number of other lodges had taken, some 50, some 40, and others 30. There were, in his district, individuals who had each 10, 15, and even 20 shares, and had paid them up. Surely a small sprinkling could be found in Bedworth who were favourable to the co-operative principle. The colliery which had been purchased by the miners' of his district would be a paying one. There were eight seams of coal, and the colliery was not more than 450 yards from the railway. They knew the coal was good in quality, and abundant in quantity. In Macclesfield, which was about 18 or 20 miles from the colliery, there was coal company whose object was to distribute coal, and not to produce it. That company had sent them a cheque to take up 100 shares, and if they required any further assistance that company was willing to take up 100 or 200 more shares. When a coal-consuming company like that sent money to enable them to open up their pits they might depend upon it that as soon as they had coal to offer they would become customers. He had also been in communication with another large co-operative coal company, of which Mr. Thomas Hughes was Chairman—a company which was now doing business in coal distribution to the extent of 4000*l.* per month, and they were waiting for them to open their pits, and as soon as they were ready to offer coal the company was ready to try and make a bargain with them. Consequently, they would have no difficulty in disposing of their coal, though they would have to get it before they could offer it. He had not come there to blow up a bubble and to float the scheme, for if he wanted to float it he could do so in Hanley, Burslem, Longton, and Tunstall. They had not selected a capitalist to take up a single share, as they wanted working men to have the benefit of the shares; but two gentlemen with capital had voluntarily agreed to take up 250 shares each, while a respectable working man, who was a practical miner, had promised to take up 100 shares. They wanted the working colliers of the other districts and lodges, and out of a private little fund, to begin and work the colliery themselves, in order that it might be proved to demonstration that there was manliness enough, desire enough, intellect enough, rectitude enough, and perseverance enough in the working colliers of this country to work and manage collieries of their own. (Applause.)

GOVERNMENT INSPECTION OF COLLIERIES.

SIR.—The reports of the Government Inspectors, of which you published an abstract in last week's Journal, contain much interesting information apart from that of a strictly official character; and as two or three questions are raised which are well worthy of consideration, I must ask you to permit me to call attention to them. With regard to certified managers, for example, there appears to be some doubt after all whether the effect of the Act will not be prejudicial to workmen, to employers, and to managers themselves, and at the same time fail to add anything to the safety of the collieries. For instance, the Inspector for the Northumberland district (Mr. James Willis) states that the clauses relating to certified managers have given rise to great dissatisfaction amongst certain of the officials connected with the management of the mines in his district; and, judging from the correspondence columns of some of the newspapers more especially devoted to mining, these clauses have not been without similar results in other districts. The result in this district of the varied renderings of the clauses, together with the regulations and instructions issued from the Home Office from time to time, has been that the person (or officer) universally appointed manager is, in his opinion, not a manager at all, has no real control, and ought not to be responsible as manager. However, as stated above, it is perhaps too early to criticise the working of a new Act, and he is glad to be able to speak with confidence of the earnest endeavours of all parties concerned, owners, officials, and workmen, to comply with its provisions. Now, this is really a very difficult matter, and perhaps the more so because there appears to be no readily available remedy. The system of having certified managers was essentially a working man's measure, so that working colliers cannot consistently ask for the repeal of the clause, the managers cannot do so without creating the opinion that they feel themselves incompetent to pass the examinations, and the owners can do nothing without running the risk of being charged with sinister motives.

Referring to explosions, Mr. Lionel Brough very reasonably discredits the statement so often made of sudden outbursts of gas, and observes that it is too often suggested that the cause of a calamity is anything, in fact, except the true cause—insufficient ventilation. As to gas, he says the only approach to a "Palladium" is fresh air sweeping throughout the workings, cooling down all the pit, mixing itself up also with emanations in such manner as to render harmless every noxious thing in the colliery. But these desiderata cannot be arrived at unless the shafts from surface to bottom, and every gallery in the mine as well, be of adequate sectional area, accompanied with vast ventilating power. In connection with this subject, he adds that strange theories have been surmised, more especially as regards shot firing. One is the sudden exudation of gas from fresh coal faces by reason of vibratory action; or, again, vacuum following detonation, thus causing fire-damp to rush out of the solid coal. He believes these views to be altogether untenable. Most likely gas was already liberated, and the ventilation was faint. Fire-damp will sometimes secrete itself where the deputy's careless safety-lamp has never penetrated; then, perhaps, a chance shot is fired, and is followed by an explosion of carburetted hydrogen; flame from some of these shots is often very far reaching indeed. In coal mines where powder is used plenty of firemen and a searching scrutiny all round about with the Davy before the shot is fired is the nearest approach to safety. With our present amount of knowledge it is evident that safety-lamps cannot yet be dispensed with—perhaps never will. But, in the course of time, human ingenuity will possibly lead to great improvement in them, but we cannot allow those we possess to be superseded except by one of universally acknowledged superiority. Much real ability has been exhibited in the invention of apparatus to prevent the surreptitious opening of locked lamps, but he is impressed with the opinion that the employment of strictable sub-officers, and of respectable trustworthy workmen, will be found to be the best way to keep the lamps locked, better than even the most ingenious mechanical process yet discovered.

The diminution in the number of casualties in Mr. Baker's (South Staffordshire) district is very remarkable. He remarks that the

results of a single year in a matter so fluctuating as mining accidents cannot be depended upon, but the steady and striking decrease in the loss of life in this district during the whole period in which protective legislation has been applied to coal mines cannot but be regarded as a most gratifying result of the measures taken to diminish the hazard of the miner's occupation. In no year during that long interval have so few lives been lost in this coal field as in 1873, and the average has been steadily declining. For the first 10 years of inspection the average was 162, and for the next 10 years, ending 1870, it was 107, whilst for the three subsequent years it is only 88. In no mining district was the interference of the Legislature more needed than in South Staffordshire; and in none has it proved more beneficial, and facts given above clearly show that by proper care the working of mines may be rendered far less dangerous to life, and give good ground to hope that further improvement may be secured. In spite of the comparatively favourable results 1873 shows, I am satisfied, that the death-rate would have been still lower had the mining operations been in all cases directed with an ordinary amount of skill and care.

The mixed use of safety-lamps and candles has frequently been condemned in the *Mining Journal*, both editorially and by correspondents, and an additional evidence of the danger is given by Mr. Wardell, who mentions that one more proof of the dangerous system of mixing safety-lamps with candles in a fiery seam occurred at Willow Bank Colliery on Oct. 10. Joseph Beckett, a miner, was on that morning at work in a shaft bord, and when he began at six o'clock he had a safety-lamp, his hurrier, who hurried to within a few yards of him, having a candle. The place was in the neighbourhood of some faults, and when the deputy visited it that morning he found a little gas on the top; he then ordered Beckett to put a slit through in order to ventilate the bord, and told him when he holed he, the deputy, was to be informed. The man, however, seems to have lighted a candle after a time, and a shot which was fired in the vicinity disturbed the gas, which ignited at the open light, and so burnt Beckett as to cause his death. The arrangement which gives a man an opportunity of changing his lamp for a candle is one to which Mr. Wardell has always strongly objected.

The sudden outburst of gas in such quantity as to jeopardise the entire mine, provided the mine be ordinarily ventilated, has frequently been denied by practical men, and there is really few well authenticated cases on record; indeed, I recollect but one, and from that no loss of life ensued. It was in Mr. Hedley's district I think, and there were about 300 men employed—all with locked safety-lamps. The outburst occurred and filled the pit in 10 or 15 minutes with gas, but as no naked light was exposed the men were all got out in safety. The use of mixed lights is absurd; if a pit be so foul as to require lamps in any part, naked lights should be rigorously excluded.—*Durham, Dec. 8.*

H. J. C.

MACHINERY AS APPLIED TO THE UNDERGROUND WORKING OF MINES.

SIR.—Of vast importance is this subject to all those who are, however slightly, interested in mining, whether metallic or otherwise, for it must be evident to the casual observer as well as to the most astute thinker that at no distant period machinery must supersede labour by hand, at first, perhaps, in a small degree, but with a scope gradually widening and extending its bounds. It, therefore, behoves everyone not only to take a passive interest in the advancement of the utility of machinery, but also to give those who strive to adopt the machines to the obviating of manual labour every encouragement. Deep thought has been working, endeavouring to devise a simple, easily applicable, and adaptable machine for coal-cutting and rock-boring. Science has exhausted herself in researches and trials, but the difficulty has become more apparent as progress is made. Even as it was with inventors like Stephenson and Watt, at every turn they had to encounter ignorance, prejudice, and what not, but the time shall come, nor long remote, when not only will rock and coal be wrought by machinery more cheaply than by hand but more uniformly, and the work will be accomplished more satisfactorily in many ways. But though few desire to see these appliances introduced more than myself, I cannot shut my eyes to what meets me in every newspaper at each folio—I mean the item of cost. Machine work will never supersede manual until the cost of the former approximates or becomes even with the latter.

Although I have from time to time observed in the *Mining Journal* very interesting statistics regarding the rate of progress in the St. Gothard Tunnel, operating with dynamite, I think if those statistics were supplemented by statements of cost they would be not only more interesting and instructive but more encouraging. I fear, however, that the cost per fathom would not compare very favourably with that paid for hand-boring. This was the case with the Mont Cenis Tunnel; the cost per fathom was enormous, but as the company of contractors had 1,000,000 *frs.* for every year they gained on the time specified in the contract, in the long run they were the gainers. At that time boring machinery was in its infancy, and the machines were complicated; but with the modifications and improvements since introduced they have been remodelled, and the result now might be far different as to expense.

Some months ago some interesting particulars of a trial of boring machines appeared in the *Mining Journal*, stating that Mr. Doring had made a trial of his machine at Tincroft and Dolcoath. This was a mere experiment, and like most experiments was—failure. It was in many ways conducted under favourable circumstances. At Tincroft the level was driven 6 ft. \times 6 ft.; consequently, at much greater expense, and the contractor, being paid less than the working miner, was forced to suspend his operations. At Dolcoath, too, the experiment failed, though from a different cause. Mr. Doring first laid down a 2-in. air-pipe, which was afterwards supplemented by a 3-in. one. The consequence of having two pipes of small diameter instead of one of larger size was evidenced by a great loss of power, through friction and other causes; therefore Mr. Doring could neither sink or drive as fast or as cheaply by machine-power as by hand labour, and was forced to give up the trial. But this was more than five years ago, and since then the improvements effected warrant a re-trial. I think Mr. Waddington should have at least fair play in the trial of the machine at Wheal Agar, and I can only hope he will publish returns of the amount of work done and the cost per fathom. The machine goes to work at a time when labour is cheap in Cornwall, and this may be viewed as a disadvantage by some; further investigation will show that idea to be a fallacy. The history of the boring machine is fraught with interest to all miners, especially Cornish, and we hail its introduction as the harbinger of increased prosperity, and wish the plucky introducer, Mr. Waddington, the boon which he doubtless desires and richly deserves—success. Coal-cutting machinery will form the subject of a subsequent letter.—*Dec. 7.*

N. B.

ROCK-BORING MACHINE.

SIR.—In the article on the "Darlington Rock-Borer," which appeared in the Journal of Nov. 28, there is no criticism on any other boring machine now before the public. The point of chief interest to miners is not to what extent or in what way one boring machine may differ from another, but it is what means are necessary for expediting exploratory works, and how far can reliable boring machines be advantageously substituted for hand labour? In reference to the American "drills" known in England, I stated that each machine is characterised by different varieties of "striking-gear," and this I repeat is the case. I also remarked in somewhat technical language that no "self-contained" machine can strike the blow, and open the valve exhaust port after such blow is struck. Now, every borer known to me with a "maintained connection" between its reciprocating parts and the valve acts with an elastic blow, the piston being cushioned, by admitting the steam on one side and exhausting it on the other a moment or so before the blow is struck. With regard to the striking weight or cutting effect of a borer, it is evident that it must be in proportion to the combined weight and velocity of the piston to which it may be attached.

In the present state of the boring machine question in this country, mere schoolboy and noisy challenges will have but little weight with the thinking part of the mining public. A machine in constant request and duplicated nearly 500 times will for practical pur-

poses be regarded with greater favour than a mere holiday and illusive show of different borers. Of the use of the Brydon, Davidson, and Warrington machine in Prussia I have no exact particulars, but it will be easy to obtain them.

X.

ROCK-BORING MACHINERY.

SIR.—The following remarks appear in the Supplement to the Journal of Nov. 28, under the heading of Percussion Rock-Boring Machinery, in connection with the Darlington Rock-Drill:

"The contrivance for rotating the drill was patented jointly by Jordan and Darlington many years ago, and since adopted by other makers, is inside the cylinder." &c.

Allow us to observe, for the information of your readers generally, and especially for that of Messrs. Jordan and Darlington, that the Burleigh rock-drill specification, dated Nov. 22, 1866, No. 3065, describes in the clearest and most unequivocal manner the spiral rotating action for the drill or borer; and that Jordan and Darlington, in their specification, dated Nov. 29, 1867, merely repeated what had thus been already stated and secured. You can easily assure yourself of this fact by a reference to the official documents quoted. In conclusion, we must add that if such claims are made we shall feel ourselves, however reluctantly, bound to take action for the protection of our own interests. Please to favour us by inserting this explanation in your next issue.

T. BROWN AND CO.

Newgate-street, London, Dec. 10.

ROCK-BORING MACHINERY—TREVITHICK.

SIR.—No name is better known in Cornwall than that of Trevithick, the illustrious engineer, a man who displayed extraordinary powers of mind and fertility of invention, the father of high-pressure steam-engines, and the contriver of numerous labour-saving machines—machines which have only been fully appreciated during the last 20 years, and which in many instances are associated with other names. In the "Life of Trevithick," written by his son, vol. ii., p. 23, is found the following passage:

"Trevithick was equally ready with the application of steam power, either for pumping of water or for boring and removing rock. The use of chisels and rock (stone) breakers in the Thames in 1803, had prepared the way for the more perfect engine for boring, lifting, and carrying rock from the quarries to its destination at the Plymouth Breakwater in 1812."

In a letter from Trevithick to Mr. Fox, jun., dated Camborne, Jan. 29, 1813, 61 years ago, he states—

"Since I was at Rockrow I have been making trials on boring lumps of Plymouth Limestone, at Hayle Foundry, and find that I can bore holes five times as fast with a borer turned round than by a blow, or jumping down in the usual way, and the edge of the boring-bit was scarcely worn or injured by grinding against the stone, as might have been expected. I think the engine that is preparing for this purpose will bore ten holes of $\frac{1}{2}$ in. diameter 4 ft. deep per hour. Now, suppose the engine to stand on the top of the cliff, or any level surface, and a row of holes bored 4 ft. in from the edge of the cliff, 4 ft. deep, and about 12 in. from hole to hole, for the width of the piece to be brought down at one time, and wedges driven into the holes to split the rock in the same way as they cleave moorstone, only instead of holes 4 in. deep, which will cleave moorstone rock 10 ft. deep when the holes are 14 or 15 inches apart, the holes in limestone must go as deep as you intend to cleave out each slope, otherwise the rock will cleave in an oblique direction, because detached moorstone rocks have nothing to hold them at the bottom, and split down the whole depth of the rock."

On Feb. 4, only six days later, he wrote again to Mr. R. Fox, jun.:

"Since I was with you at Falmouth, I have made a trial of boring limestone, and find that the men will bore a hole 1½ in. in diameter and 1 in. deep in every minute, with a weight of 500 lbs. on the bit. I had no lump more than 12 in. deep, but to that depth I found that having a flat stem to the bit of the same width as the diameter of the hole, twisted like a screw, completely discharged the powdered limestone from the bottom of the hole without the least inconvenience."

From the foregoing statement, and extracts from Trevithick's letters, it is clear that the great Cornish engineer anticipated two of the chief points of later patented borers, such as drilling by means of pressure, and using a twisted tool. In May, 1814, Trevithick's rock-drilling machinery was delivered at the Plymouth limestone quarries, but the practical success of the invention does not appear to be recorded.

X.

DIAMOND ROCK BORING.

SIR.—Can any of your readers inform me if there is any truth in the rumour that the American Diamond Rock Boring Company are about to open a branch establishment in this country? I remember seeing in print a remark made by Dr. Playfair to the effect that the English company had an undoubted patent right upon the system of boring by diamonds; but if this rumour be true, it would seem that their patent extends only to the machine. Competition is nearly always beneficial to the public, and the prestige the Americans have gained by their application and working of this system bodes well for any efforts they may make in this country.

CARBON.

DOUBTFUL MINERALS.

SIR.—The other day, when I hastily chalked (*vide Chemical News*) on Mr. Lowe's back (*i.e.*, post-card), I didn't think that you would hold council with yourself over it. Feather me, stick me like a guy in the corner, and label me with the dubious adjective, "Archimedean." When I wrote my letter to the *Chemical News* about "Doubtful Minerals" I think "I was all there"; and if you pronounce *ex cathedra*, and the "all" not very much, you will find me Lutheran enough to retort—"God has given no man the ability to do much, in order that something might be left for every man to do." I don't think I used the term, but your rendering of it recalls to my mind two facts not at all in relation—the fact of having once had to pay a penny for a cane to be thrashed withal, and the famous sermon on MALT: M, my masters; A, all of you; L, leave off; T, tippling. I happen to be more of a follower of St. Wilfred; and this you may please to T, tell; A, all; R, your readers. But to business. I didn't in that letter, in thought, word, or deed, "jeer" at Maskelyne or Dana. I am under great scholarly obligations to the one, and I have too much sincere respect for both, to do anything of the kind. See what inconvenient vehicles of thought and fact words are, and in these "infallibility" and "anathema" days how much more necessary than ever it is to have clear and unmistakably pronounced "definitions." I am just fancying you picking up a stone at the corner of Chancery-lane, and finding out "somehow" that it is silicate of nickel, containing a little more water than usual, and, *ex cathedra*, pronouncing it *Miningjournalite*. Do you think you could induce Maskelyne, Dana, Smyth, Forbes, Morris, Tennant, or anybody else to adopt your bantling? Yet such a thing to do wouldn't be half so meaningless as many similar acts of others I could cite.

You admit with me that "some of the present names of minerals are simply silly"—so far so good. You say, also—"Upon the whole you prefer Dana (to Maskelyne), because you believe his nomenclature more likely to be generally adopted." I do not. I prefer Maskelyne for many reasons; and I just like to hint in the most delicate manner in the world that your own faith in Dana is not shown in your works, or in your allocution you wouldn't have written copper glance and copper pyrites, but chalcocite and chalcopyrite instead thereof. Thus, like some theologians, you have mistaken Peter for Paul. Again, let me apply a test—Suppose next week, in your report of current sales of metallic ores, you eliminate such old-fashioned English names as lead ore, blonde, black tin, and copper pyrites, and substitute Dana's galena, sphalerite, cassiterite, and chalcopyrite. Do you think you could do it "without offending the popular prejudices of uneducated fellow-countrymen"? You couldn't. The mining world would "pitch" into you; and the professors in Jermyn-street, whose mineralogical knowledge and experience, in any case, are equal to Prof. Dana's, great as they are acknowledged to be, would have a jolly good laugh at you. In Jermyn-street the professors never think it a condescension when lecturing to speak expressive Saxon whenever it can be done, and this your own reports of Prof. Smyth's excellent mineralogical lectures fully testify. Another step:—You say that in chemistry "the close similarity of the nomenclature in the principal European languages has already been productive of great advantage, and it would be a matter for congratulation if similar uniformity could be secured in mineralogy." All this I stedfastly believe. You will also admit that without minerals there would be no mining, that without mining there would be no *Mining Journal*, and without a *Mining Journal* you couldn't occupy the Editorial chair. Admitting this much, and that the science of Mineralogy is at the bottom of it all, does it not occur to you to lend a hand yourself at making the language more uniform; or, as one might say, at simplifying the nomenclature? Again, have you any objection to jolly Tars in general? A good deal of the

prestige of the country is due to them. Of course long ago you heard of one, "Lord Nelson." He was a Tar of the first water. Well, he and I were born at the same place, though not at the same time. I was on friendly terms with the officer of his ship who ran up the never-to-be-forgotten signal—"England expects every man to do his duty." I have also heard Braham sing "Stand to your guns;" and my great desire is to stand by the latter, and discharge the former. No want of loyalty in this, I hope. Not open to expostulation, is it? But, chemically speaking, what do you say of tar? You write like a chemist. Tell me—Have you carefully analysed tar, or are you acquainted with those who have, or both? If so, you must very well know that (coal) tar has been made to yield more than half a hundred distinct substances, and that some of them are of marvellous use, and others of appreciated beauty. In the handling of tar or its products, then, dear Mr. Editor, be careful. Don't hit it hard with your Holtzapffel; it has no cleavage. It does not delie like pitch; it spatters and sticks.

But, dropping metaphor, what have I done more than, as Prof. Maskelyne says, in a "good humoured" way, attempted to draw attention to a very important but neglected subject? Please to collect that philosophy in sport may sometimes become science in earnest, and that to work seriously at anything it doesn't necessarily imply that a fellow should have a face always as long as a fiddle, or to keep on the regular footpath or highway either. It is not clear to me that I should have succeeded in any other way. I owe my allegiance to this free country, and to no Pope whatever. I am jealous of the mineralogical honour of my countrymen. I am annoyed that we have to be taught by Transatlantic professors, whilst we have their equals at home. I resolutely take my stand at the British Museum. I have taken exception to only one word of Prof. Maskelyne's nomenclature—*caliate*, and that I don't care about. I have fired off one shot, and I mean to keep pegging away until I have accomplished my unselfish object, or until there is not another shot left in the locker. I have spent a good deal of money, and many hundreds of, perhaps, useless hours (at little better than crossing-sweeping) in the study of mineralogical books. I have learned positively to luxuriate in the society of my minerals; they are ever telling me something that is truthful and delightful, and far above and beyond anything that has ever been put on canvas. I desire a cutting made here, and an embankment there, so that the student's train may run more evenly; that students may be spared as much profitless labour as possible; that they may henceforth be counted by thousands, instead of, as now, by dozens; and that they may revel in this cheap, rational, healthful, and elevating enjoyment; for I am more than ever confident of this, as I have written elsewhere—"That the more a man becomes acquainted with God's own works, the more likely will he be to attend to His words."

Liverpool, Dec. 3.

Yours, sticky as ever, T. A. R.

MINERALOGY.

MINERALS: THEIR HISTORY, CHEMISTRY, GEOLOGY, USES, AND COMMERCIAL IMPORTANCE.

BLACKLEAD—PLUMBAGO—CARBIDE OF IRON—OR (MORE CORRECTLY) GRAPHITE.

SIR.—Having pretty well gone through the series embraced under the denomination of iron ores, I now enter upon those in which this metal itself appears to occupy a subordinate position. Of these the carburet, sulphide, and tungstate may be considered the principal types. Upon this occasion I shall confine myself to the first-named—namely, the carburet, or as it is usually though improperly designated plumbago or blacklead, both names implying that lead (plumbum) is a constituent of the mineral. A more fallacious designation was never given. Not a trace of lead, in the experience of any chemist, was ever found as associated with the so-called plumbago. The origin of the name doubtless arose from its communicating to paper when marked by it a leaden or slatey grey colour, passing into iron black, and for this characteristic it has been used from time immemorial for polishing fire-stones and grates, and hence it is held in the highest estimation by thrifty housewives, and by them is never likely to fall into disuse. The true composition of graphite, when pure, may be considered a very rich carbon, owing its peculiar colour to the presence, in somewhat minute proportions, of foreign matters. Of these elements iron may be regarded as the chief, though it would appear from analysis that even this metal is not always a constituent of plumbago, and in other instances it is discovered in exceedingly minute traces. The elements constituting this mineral, therefore, are exceedingly erratic both in nature and proportions. Dana, the great American authority, quotes six varieties, ranging from 81 to 98.9 per cent. of carbon, and 10 to zero of iron, with sometimes oxygen, sometimes silica, and in a solitary instance a minute proportion of alumina, taking the place of the iron. Hence it would appear that even the appellation of carburet of iron becomes a misnomer. The true crystallisation of graphite is undetermined, or, perhaps more correctly speaking, it assumes a variety of forms. My collection exhibits hexagonal, and the forms it there assumes are granular, compact, and striated. My specimens are from Borrowdale, Ticonderoga, U.S., Canada (all very splendid types), Germany and Russia (these inferior). With respect to samples I possess from Canada, they bear so close a resemblance to molybdenite that only a practised eye or chemical analysis could determine the difference; the latter process I found very conclusive, though it was submitted to me as molybdenite by a tolerably expert mineralogist. From Ticonderoga I received amongst others a very beautiful specimen of pencil lead, and was assured it was by no means a picked one, but that the supply of such was illimitable. Presumably this must produce a serious effect upon the demand for and price of the Borrowdale variety. With these preliminary remarks I pass on to historical details.

It has probably occurred to few, even those who take the liveliest interest in the scientific and mercantile position of Great Britain, to devote any particular time or attention to such a speciality as blacklead, still there are many features in the enquiry fraught with the deepest importance both to the student and the man of business. Setting aside, for the present, the geological indications of the existence of plumbago in the bowels of the earth, the locality of its natural development in this country is most interesting. In the year 1751 a gentleman who had recently been to the blacklead mine of Borrowdale, in Cumberland, gave a vivid description of his visit, describing the neighbouring market town—Keswick—as bearing the appearance of antiquity, whilst he most flatteringly speaks of the "poorer inhabitants as subsisting chiefly by stealing, or clandestinely buying of those that steal, the blacklead, which they sell to Jews or other dealers." Another writer, in 1794, refers to the Wad Mines, as he designates the explorations, being opened that year, the custom in those days being to work the property every five or seven years, upon each of these occasions taking out a quantity sufficient to meet the interim demand. This writer adds:—"Graphite, or pencil lead, is taken out in lumps sometimes as big as a man's fist, which, when it is pure, soft, black, and close-grained, is worth sometimes 35s. per pound. A third visitor writes about the same time, "In this parish (Seattallorfell) is that famous mine of blacklead, or wad, a mineral very scarce elsewhere, thus described by Mr. Robertson in his 'Natural History of Westmoreland and Cumberland': 'Its composition is a black, pimquid,* and shining earth, impregnated with lead and antimony. Its natural uses are to glaze and harden crucibles and other vessels, made of earth and clay, that are to endure the hottest fire; and to this end it is wonderfully effectual, which enhances the price of such vessels. It cannot be made malleable.'

Making allowances for the imperfect state of mineralogical knowledge of those days which led the writer to associate lead and antimony in the composition of the mineral in question, it is clear that one of the principal uses to which it is put is now in vogue, and we also learn that amidst the numerous and startling innovations of modern art no substitute has hitherto superseded plumbago in the manufacture of crucibles. The following interesting record of the visit of Bishop Nicolson to these celebrated mines is given in a letter to Dr. Woodward in 1710:—"Having lately had notice of the opening of our wad mines above Keswick, I hastened to see a curiosity which I have never hitherto had an opportunity of viewing, and if this

were omitted I was never likely to have another. From Keswick we travelled up the valley of Borrowdale, along the banks of Derwentwater, six or seven miles, or more, till we came to Seethwaite Moor, where ascending a high mountain we at length reached the mine. On the first opening of the old level, in the latter end of June last, great discouragement appeared, for no search had been made for 32 years. They found that some pilfering interlopers had carried on the old work till they had lost it in the rock. Upon July 3 (the day that we got thither) a belly was happily discovered before the forehead of the 'old man' (a term with miners for the old works), which proved so rich that in less than 24 hours they had filled several sacks with fine and clean-washed mineral. Dr. Meneth, in his 'Pinax,' would persuade one to believe it so scarce that it is nowhere in the universe to be met with save in Old and New England, and that this is the only place within the four seas where it can be had with us. Mr. Dales would induce one to believe it a common mineral. He particularly reckons up three several sorts of it, brought from so many different countries, whereas he allows that of our English growth (*sic*) to be the best, that of Spain the next, and condemns what is brought from the East Indies as the worst of all."

In an Act of Parliament, 25 Geo. II., c. 10, making it felony to break into any mines, or wad-holes of wad, or black-cawkes, commonly called blacklead, or to steal any from thence, there is a recital that the same has been discovered in one mountain or ridge of hills only in this realm, and that it has been found by experience to be necessary for divers useful purposes, and more particularly in the casting of bomb shells, round shot, and cannon balls. Mr. Pennant says:—"Saw at Dr. Brownrigg's a great variety of the ores of Borrowdale, such as lead, common and fibrous, black jack, and blacklead, or wad. This last is found in greater quantity and purity in those mountains than in any other parts of the world." To what a serious extent would Mr. Pennant modify his sentiments had he possessed the experience subsequent researches have afforded. America, Russia, and Canada have both developed treasures which appear to throw into the shade the boasted quantities, and threaten to rival, if they have not already done so, the superiority of our English product. But of this anon.

The learned Boyle opines, "It is not a metal, and has nothing of metallic character about it. It is a singular substance. It is found but in very trifling quantities in several mines here, and it may also be in other countries; but the sole mines in which it is found by itself are in Borrowdale. One of the principal uses to which it is put is the manufacture of pencils. Their being confined to this country is so well known and so universally allowed that they are styled abroad *Crayons d'Angleterre*. It arises from hence that this substance is little known to foreigners, the most learned of whom speak of it confusedly, and with much uncertainty. These further particulars we may venture to affirm concerning it, without any danger of misleading our readers, that the mine before mentioned is private property, is opened but once in seven years, and the quantity known to be equal to the consumption in that space is sold at once, and as it is used without any preparation it is more valuable than the ore of any metal found in this island." "But," he adds, "there is nothing improbable, much less impossible, in supposing that other uses will be discovered, which would certainly contribute to raise the value of a mineral peculiar to this country." Continuing this historical sketch, we find in the "Gentleman's Magazine" for 1751 the following interesting and instructive details:—"Skiddaw is undoubtedly one of the highest mountains in Britain, the declivity of which, from White-water-dash, at the foot, to the summit, measures nearly 5000 yards, but the perpendicular height cannot be much more than a fourth part of that. Near Keswick is another lake, near two miles long and four broad, in which several islands are interspersed, but not inhabited, by German miners. We had not ascended far before we perceived some persons at a great distance above us, who seemed to be very busy, though we could not distinguish what they were doing. As soon as they saw us they hastily left their work, and were running away, but by a signal from our guide, who, probably, was but too well acquainted with them, they returned, to the number of 18. We came up to them after an hour of painful laborious travelling, and perceived them to be digging with mattocks and other instruments in a great heap of clay and other rubbish, where mines had been formerly wrought; but though they were now neglected by the proprietors, as affording nothing worth the search, yet these fellows could generally clear from 6s. to 8s. per day, and sometimes even more. The blacklead is found in heavy lumps, some of which are hard, gritty, and of small value, others soft, and of fine texture. The hill in which it is found is a dirty brittle clay, interspersed with springs, and in some places shivers of the rock. It should be added that the lumps found in the rubbish seldom exceed $\frac{1}{2}$ lb. in weight, but those found in the mines are said to weigh 6 or 7 lbs. The mine is situated near the summit of the mountain; at the entrance is the miner's lodge, and there was a principal heap of rubbish, about 150 yards above the one referred to, and here were several fellows and girls at work within pistol-shot of the hut. It appears that in the mine itself the miners work forward for the mineral, and the pits resemble quarries or gravel pits. The mines lie on the east side of a very steep mountain, which forms the west side of the vale of Stomethwaite. There are two workings—the one is about 340 yards above the level of the sea, and the upper one about 390 yards. The perpendicular depth of the lower one is about 105 yards, and of the upper between 20 and 30 yards. There are two certain marks on the surface to direct the miner to the mineral. The strata of the mountain are very irregular and broken, and the blacklead probably found in the fissures of the rocks. There is no regular stratum of this mineral; it is met with in lumps and irregular masses. The miners generally work through a quantity of earth, mixed with stones of various kinds, then a species of hard grey granite, and after that a dark blue stone of a softer nature, where they sometimes meet with the mineral. Quartz and crystals are found in the workings. The rock adjoining the mineral is sometimes tinged as dark as the mineral itself to the depth of 2 or 3 ft. The mines are well defended against pilferers by a temporary masonry and walling within, and a house over each entrance, which are occupied by the stewards and workmen. Of this mine it is written in 1792:—"The Wad mines were very unsuccessful for many years past, but last year they met with the blacklead again in a pretty large quantity, but of the inferior quality, of which the miners in a short time procured about 5 tons. The mineral is described as lying in the mine in form resembling a tree; it hath a body or root, and veins or branches fly from it in different directions; the root or body is the finest blacklead, and the branches or extremities the worst the further they fly. The metals (query, minerals) in the low mine lies in two veins—one crossing the other; where they cross is the main body, and the best blacklead and the veins fall perpendicularly for 60 fathoms in depth, the blue rock on each side; at the end of 60 fathoms they found the end of the cross vein, and a large sop of the mineral, which came out as if it had been in a wrought basin—the form of the blacklead and the rock were so equal. A blue rock lies on each side of the mineral, and sometimes there is a wet sludge between the rock and the blacklead. It is, also, sometimes found in sops or floats in a body, without branches. W. WHITE.

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[To be continued.]

METEOROLOGY—THE COMING WINTER.

SIR.—Although meteorology is one of the youngest of the natural sciences it shows a healthy growth, and already lends substantial aid to man in his battle with the elements. The law, for instance, of circular storms enables the Meteorological Department to forewarn our coasts and those of our neighbours of the approaching tempest. The next great step, it is hoped, will give us the power to forecast the general character of the coming seasons. As yet no theory with this view has stood the test of experience, or commanded the assent of the scientific world. It is the object of this letter to make known to your readers the main features of such a theory, advocated chiefly by French meteorologists, and based on the familiar idea that the vicissitudes of our climate are due to the antagonism of great equatorial and polar air currents.

According to this view there exist two master currents of air—one passing over the Atlantic from south-west to north-east; the

other to the eastward of it, flowing back from north east to south west. The existence of such general currents is now not doubted, and to their influence may be chiefly attributed the strong contrast exhibited by the climates of places in the same latitude in Western Europe and Central Asia. Each of these broad currents may be likened to a great river flowing in an extended plain, subject to floods and lateral overflows, but whose main channel slowly varies its course from side to side.

If we consider the Atlantic current, and suppose its main channel to occupy its easternmost position, we shall have a vast body of warm moist air flowing over Western Europe, giving to it mild winters and wet summers, with frequent storms, which are no other than whirling eddies in the great stream. Such were the seasons of 1871, 1872, and 1873.

Let us now suppose the main channel of this current to have retreated over the Atlantic plain so that its course passes at a certain distance to the westward. Our islands and the adjacent continent would then lie, as it were, in a hollow between it and the down north-east current further east; and we should enjoy the fine weather with which we have been blessed during the past year. It must be remarked that, entirely in accordance with this view, during this same period our extreme western and north-western coasts have come in for much rain and storm, and that the north-east current has been felt with more than ordinary severity in Asia Minor and the Eastern Mediterranean.

If, pursuing its retrograde course, the main channel of the Atlantic current should recede still further to the west, then the supposition is that the corresponding north-east current would also come further westward, bringing with it severe winter cold. If this theory be correct, a knowledge of the position and tendency of movement of the main channel of the Atlantic current should afford us the long sought for key to unlock the secret of the coming season. At any rate, enough has been adduced to show the importance of a more extended and more accurate study of the Atlantic air stream. This can be done by an analysis of the logs of the steamers and other ships so incessantly crossing this ocean, and the Meteorological Office have alone the means of doing it. Any forecast based on general reports must necessarily be very vague.

We have, however, in accordance with the above views, some indications that the winter will be colder than for some years past. Severe cold has already set in at the head of the Baltic, and we hear of great storms along the Western Atlantic. On the other hand, the weather on this side also has been more stormy than it was last year. But our storms may be caused by overflows of the Atlantic current, whose main channel may, nevertheless, be far to the westward.

C. O. B.

WHAT IS ELECTRICITY?

SIR.—Will you allow me to make some remarks in answer to the letter of a "Constant Reader" in the Supplement to last week's Journal? A "Constant Reader" states that if a poker is left in a fire in an ordinary grate the end which is in the red-hot coals becomes heated. How is this accounted for? He states that the molecules of the iron become violently agitated by the heat generated. This motion is increased until the whole of the iron gets hot. The above is the theory a "Constant Reader" has been taught; he believes it to be the correct theory of heat, and how the iron poker is heated when in the fire. If the above iron poker experiment is to be a proof of the modern mode-of-motion-theory of molecules of the iron becoming violently agitated by the heat generated, I cannot understand it.

In the first place—does the heat generated come out of the poker? for if we take the above theory to be correct the heat must come out of the poker, or be generated in the poker, and if so we do not want the fire, because the molecules of the iron would become violently agitated, and heat would be generated, and the poker would become hot without putting it near a fire. As I have said before, it is the same theory as Bacon's, above 600 years ago. It is only an imaginative theory, and there is not the slightest sign of its being the correct theory of heat, and the more you investigate it the more you can see the absurdity and fallacy of such a theory. Suppose I compare Bacon's theory of heat with the theory a "Constant Reader" believes to be correct. Bacon—the great Bacon I mean—invited gunpowder, so it is stated; there were several noted men of the name of Bacon, but this was the most celebrated, and he was the greatest man of his day.

A "Constant Reader" states molecules of matter; Bacon states particles of matter. A "Constant Reader" states, the violent agitation of such molecules of matter produces heat; Bacon states, the vibration and motion of such particles of matter produce heat. I want to know what difference there is between the two theories. I cannot see any. They both mean the same, and they are both suppositions only. Nearly, if not quite, all the theories of heat brought forward from the time of Bacon up to the present are the same in meaning, and the same as Bacon's theory of heat, and he was the first theory of heat ever written by man. If a "Constant Reader" can prove it to be the correct theory he must give Bacon the credit of the discovery, and the modern chemists the credit of finding the new names for Bacon's old theory of heat.

My theory of the red-hot poker is as follows:—First of all we will suppose the fire is not alight, as it is called, and the atmosphere of the room is up to 24° of heat, only 8° below freezing-point; the poker is hot now, it is hot in comparison to solid mercury, for the heat of a body is only comparative. The heat of solid mercury would be about 63° below the heat of the poker, and the poker would be 24° above zero. Now, suppose we force the poker into the solid mercury, the poker would be so hot that it would melt a hole in the solid mercury quickly, and the hot poker would quickly lose its heat, and become as cold as the solid mercury; the melted mercury will also become cold, or lose its heat and become solid again, and our poker will remain stuck fast in the solid mercury, our once hot poker is now called a cold one, supposing the surrounding atmosphere to remain at the same heat as the solid mercury—say, about 73° below the freezing point of water. If you force a red-hot poker into a piece of lead the same thing will happen; the red-hot poker will melt a hole in the lead, and when the melted lead gets as cold as the average temperature of our atmosphere the lead will become solid, and the poker will stick fast in it. How can we call this a motion of molecules of matter? I cannot see the best reason to call it so. The fact is, the heat in the poker is only mechanically mixed with the iron of the poker, and it goes off by radiation; heat is a material. I believe in this letter I can prove my theory to be correct.

Now, we will take the poker out of the mercury and bring it into the hot room, the hot room is up to 24° of heat, and the poker will quickly become hot in this case without fire. Now, the poker is 63° hotter than it was when in the solid mercury. Was the above 63° produced or generated by molecular motion, or a mode of motion, or a violent agitation, or a motion of particles of matter? The heat in the hot room is only mechanically mixed with the atmosphere of the room, and the poker remains in the room it absorbs the same amount or degree of heat as there is in the room, and such heat is mechanically mixed with the iron of the poker, the same as it is mixed with the atmosphere of the room. The articles on the surface of the earth are not impervious to the material heat, therefore everything becomes of a uniform or equal temperature, and that is the temperature of the surrounding bodies.

We will now put the poker in the fire grate among the coals; the fire is not yet alight, as it is called. The room, the coals, the poker, and all bodies in the locality are up to 24° of heat, and the heat is mechanically mixed with the above articles. Now, suppose we light the fire, and let it burn until it is a good one; the heat of a common house fire is from 900° to 1200°. Suppose, for argument sake, we say that our fire is up to 1200° of heat, our poker is hotter than it was before we lighted the fire by 1000° of heat, and the poker is red-hot. I want to know what means molecular action or mode of motion has produced the heat in the poker more now than it did when the poker gained the heat it did gain when it was taken from the solid mercury and placed in the hot room up to 24° of heat, when it gained 63° of heat? If the above theory is correct in one case it must be in the other, and we ought not want the fire; but the mode of motion action should go on, and the poker become red-hot without the use of fire. The only difference in the red-hot poker is that it has taken in more heat, and the more heat it takes the more it expands; and if the end now red-hot measured 1 foot before it was hot it will now measure a little over 1-16th of an inch longer than it did when it was cold; also it will be luminous, because at about 900° of heat iron begins to be luminous, and at 1024° of heat our poker will be red-hot. I have done all I can to prove the mode of motion theory of heat to be incorrect, at the same time strictly adhering to the truth, and I shall continue to do so throughout, and I shall try all I know to prove my theory of heat to be the correct and only theory that will stand investigation.

Now, we know the poker to be red-hot. Where did the heat come from, for you cannot have something out of nothing? If it is only heat, did it come out of the coals? I say no, it did not; for there is no more heat in a ton of coals than there is in a ton of flint stones. When the fire was lighted you started a chemical process called combustion, and in that process the following actions go on:—1st, the oxygen gas of the atmosphere combines with the carbon of the coal, and it produces carbonic acid gas, a heavy gas weighing 1½ oz. to the cubic foot; oxygen gas weighing 1 oz. to the cubic foot. When the oxygen of the atmosphere combines with the carbon of the coal and produces the above gas heat is liberated. I will give further particulars of carbonic acid gas at some future time, for I am afraid of making this letter too long. Other portions of the oxygen gas of the atmosphere combine with the hydrogen of the coal, the solid hydrogen of the coal combines with the solid oxygen of the oxygen gas of the atmosphere, and water is produced, and the heat that was chemically combined with the solid oxygen in the atmosphere is now liberated, and if liberated in a close furnace it would be at a heat above 4000°, but in the generality of fires the heat is taken away so rapidly by surrounding bodies and by radiation in all directions that common fires only produce about 1000°. Thus you see the heat to make our poker red-hot came out of the atmosphere, it was chemically combined with the solid oxygen of the oxygen gas of the atmosphere, proving the oxygen gas of the atmosphere to be a compound, and to consist of solid oxygen and heat chemically combined. I think it is plain enough for anyone to see that the heat required to make the poker red-hot was not generated at all by molecular motion or mode of motion; heat is a material, and cannot be generated or made; it can be concentrated and liberated, and with respect to the red-hot poker and the mode of motion and molecular motion theory, if we had to wait until the above process made the poker red-hot we should have to wait forever. The material heat was liberated and our fire was up to 1024°, and the poker got red-hot because it was in the hot place called a fire, and such fire was up to the above degrees of heat, mechanically mixed.

As a proof of where the heat came from, suppose we cause 111 ozs. of the solid hydrogen of the coal to combine chemically with 889 ozs. of the solid oxygen contained in 889 cubic feet of the oxygen gas of the atmosphere, we shall produce as

near as possible 1 cubic foot of pure water, weighing 1000 ozs.; by the above chemical process we have reduced 889 cubic feet of the oxygen gas of the atmosphere to less than 1 cubic foot, and in so doing we have liberated all the heat that was chemically combined with the solid oxygen in 889 cubic feet of oxygen gas, and the above gas and heat were in the atmosphere. All the heat liberated has become heat mechanically mixed with the atmosphere, and before it was chemically combined with the atmosphere. Before we lose it all by radiation we must believe that the poker was made red-hot with the above heat coming from the atmosphere. Now, we have 1 cubic foot of water, and as the room is at so low a temperature, 24° only, we will allow it to become a large piece of ice, weighing 62½ lbs. This large piece of ice came out of the coal and the atmosphere, 1-9th of it came out of the coal and 8-9ths out of the atmosphere; or, we might say, 111 ozs. of it came out of the coals and 889 ozs. out of the atmosphere. The 111 ozs. of solid hydrogen were chemically combined with the solid coal, and the 889 ozs. of solid oxygen were chemically combined with heat or electricity in a certain form, and formed oxygen gas in the atmosphere.

I have stated that electricity is only free heat. I believe I can prove it one way, and that by the use of a "Constant Reader's" poker. Suppose you have an iron conductor (say) 200 ft. high and 6 in. diameter, such a conductor would relieve a large thunder-cloud, as it is called, of a great deal of its electricity without making such a conductor hot. Now, suppose the above conductor was fixed with its bottom end 3 ft. above the surface of the earth, and if a "Constant Reader's" poker is 3 ft. 3 in. long and ½ in. thick, we will connect the top end of the poker to the bottom end of our large conductor, and the point, or other end, of the poker will enter the moist earth to the depth of three inches. We will suppose our conductor finished, and are waiting for a thunder-storm to try it; we have a storm quickly, and our large conductor receives a full supply of electricity or free heat, but not enough to overcharge it, and make it hot, the electricity will pass down our large conductor with great velocity, until it comes in contact with the poker, when it will be stopped to a great extent, the poker will be overcharged, become red-hot quickly, and will be soon heated up to, we will say, 1024° of heat. Is the poker made red-hot by the mode of motion processes? Do the molecules of the iron of a "Constant Reader's" poker generate heat? Has the motion of the particles of the iron got anything to do with it? I say no, impossible. How can a theory built up on imagination, bolstered up with all sorts of terms, and explained in all sorts of mysterious ways, stand before a simple matter-of-fact theory that all but speaks for itself? The old theory of heat, before a true theory of heat, must melt away like dew before the sun. The poker is made red-hot this time by means of free heat, called electricity: when the electricity entered our large conductor it was not stopped in its passage, nor impeded in any way, therefore it passed down it at a great velocity, its proper velocity, but when it arrived at the poker there was not metal enough to conduct it away so quick as it was supplied. It accumulated and had time to be overcome mechanically mixed with the iron of the poker, and now it is mechanically mixed with the iron it is no longer called electricity, but is called heat. If a "Constant Reader" thinks it over he must admit that it makes no difference whether the poker is made red-hot in the common fire he mentions, or whether it is made red-hot with the electricity from the clouds, so that the poker is up to the same degree of heat, (say) our old heat of 1024° the poker will take the same time to cool down. The heat in both cases was only mechanically mixed with the iron of the poker, and in each case there was the same amount and degree of heat in it.

I have not done with a "Constant Reader's" poker yet; 3 inches of it went into the moist earth, and some of the electricity passed through it into the moist earth and decomposed some of the water, then chemically combined with the materials of the water and produced gases, and these would have remained as gases for any length of time, but the red-hot poker was there, and directly the above gases escaped from the ground they came in contact with it, the gases ignited, and water was again produced, and the heat went away by radiation into the atmosphere, where it mixed (like a drop of water would be to the sea) with the great quantity of heat now mechanically mixed with the atmosphere.

A "Constant Reader's" iron poker will be of great use to us in the next explanation, and after that we can do without it. In the first place, we have the electricity from the clouds, it enters at the top of our large conductor, and if it should be dark at the time, most likely you will see a flash of light, or a sort of ball of electricity at the moment the electricity enters the top of our large conductor. From the top of our large conductor to the bottom it is charged with free heat, or electricity. And now for a "Constant Reader's" poker, for the last time; it is red-hot, and it is also charged with electricity, but we must not call it so now, because it looks so much like common heat, and so it is; it is heat, or electricity, mechanically mixed with the iron of the poker.

Now for the gases in the moist earth; here we have the heat chemically combined with the solid materials of the water or ice. The large conductor, diminished to a small diameter at the end that enters the earth, will show heat, or electricity, in all its conditions, first at the top of the conductor as free heat, also travelling down the thick conductor, as so-called electricity travels along a wire; then in the thin iron of the poker, as heat, so-called. At last we find it thoroughly entered into chemical combination with other materials and formed into gases. I think I have explained enough about gases for that part to be understood without further explanation. I could bring many other proofs to prove my theory to be true, but it would occupy too much space. With respect to a "Constant Reader's" statement that my theories, if true, would cause a revolution in the scientific world, and the whole science of chemistry have to be re-modelled, I knew this more than 30 years ago, for it is fully that time since I tried most of the experiments I have mentioned. In 1844, just 30 years ago, I told a great and well-known man that I had made some discoveries, properly applied to useful purposes, would prove of great value ultimately. I believe the old theory of heat will be overthrown this time, for it has lasted above 600 years, and that is long enough for a false theory to last.

With respect to the letter of "Electrons." I am much obliged to him for the kind feeling shown in it, as such letters give me encouragement to go on and do good if I can.—Mawbey-road, Old Kent-road.

RICHARD JEX CRICKMER.

MINING IN CARDIGANSHIRE, AND THE VAN AND VAN CONSOLS IN MONTGOMERYSHIRE.

SIR.—Taking a retrospective view of the mines in this county, and the other two mentioned in the adjoining one, for the year that is now so soon to close, I do not think that we have any reason for grumbling, but on the contrary, during a period of what may truly be termed as without a precedent for the past half-century for everything that was really bad to all and everything apertaining to mines and mining, that we have much to congratulate ourselves and those interested in these counties, not only for the mines in nearly every case holding their own, but that notwithstanding the great increase in the price of labour, the price of materials, and the fall in the value of nearly all the metals, they have, as I have before mentioned, not only weathered the storm, but the end of the year sees most of them producing in quantity and quality quite as much lead and silver as they were doing 12 months since, whilst some of the new mines have been brought into a state from the progressive into the dividend paying, whilst others have opened out courses of ore that cannot fail to bring them into a similar state in a few months, and those very few that have, on the contrary, been brought into a state of non-returns (not from the unproductiveness of the lodes in them, but from the method of working systematically adopted for many years previous of picking out the eyes of the bunches of ore, and not deepening their shafts or extending their levels) have been the means of opening the eyes of others to see how the failure (if it can be termed as such) has originated, and instead of these mines being abandoned, fresh capital is being raised to reconstitute them; and with fresh blood and fresh energy there is no doubt in my mind that they will be brought into a much more profitable state than has ever yet been the case. It will not be expected that I should go into details as to the prospects of the whole of the mines now at work in the two counties named, it would take too much of your valuable space for me to do so, and I shall, therefore, content myself by briefly noticing how matters stand at present, and how they stood this time last year.

Beginning, then, with Llanfair, the most southern mine in the county during the past year. Machinery has been erected for giving the mine a fair trial; it produces the richest silver-lead ore, or silver ore, in the county (for it is more valuable for the latter than for the former) and will undoubtedly prove a good-paying property on the capital necessary to develop it.* Between this and the mines at Pontrhyd-y-fendigaid very little has been done for some years past. At Strata Florida ore has been raised by tributaries, the shareholders doing nothing to prove the mine. This property has now got into other hands, and fresh capital subscribed for its working, and from the large quantities of ore taken from the little workings, I have no doubt it will prove a profitable investment.

We will now put the poker out of the mercury and bring it into the hot room, the hot room is up to 24° of heat, and the poker will quickly become hot in this case without fire. Now, the poker is 63° hotter than it was when in the solid mercury. Was the above 63° produced or generated by molecular motion, or a mode of motion, or a violent agitation, or a motion of particles of matter? The heat in the hot room is only mechanically mixed with the atmosphere of the room, and the poker remains in the room it absorbs the same amount or degree of heat as there is in the room, and such heat is mechanically mixed with the iron of the poker, the same as it is mixed with the atmosphere of the room. The articles on the surface of the earth are not impervious to the material heat, therefore everything becomes of a uniform or equal temperature, and that is the temperature of the surrounding bodies.

We will now put the poker in the fire grate among the coals; the fire is not yet alight, as it is called. The room, the coals, the poker, and all bodies in the locality are up to 24° of heat, and the heat is mechanically mixed with the above articles. Now, suppose we light the fire, and let it burn until it is a good one; the heat of a common house fire is from 900° to 1200°. Suppose, for argument sake, we say that our fire is up to 1200° of heat, our poker is hotter than it was before we lighted the fire by 1000°, and the poker is red-hot. I want to know what means molecular action or mode of motion has produced the heat in the poker more now than it did when the poker gained the heat it did gain when it was taken from the solid mercury and placed in the hot room up to 24° of heat, when it gained 63° of heat? If the above theory is correct in one case it must be in the other, and we ought not want the fire; but the mode of motion action should go on, and the poker become red-hot without the use of fire. The only difference in the red-hot poker is that it has taken in more heat, and the more heat it takes the more it expands; and if the end now red-hot measured 1 foot before it was hot it will now measure a little over 1-16th of an inch longer than it did when it was cold; also it will be luminous, because at about 900° of heat iron begins to be luminous, and at 1024° of heat our poker will be red-hot. I have done all I can to prove the mode of motion theory of heat to be incorrect, at the same time strictly adhering to the truth, and I shall continue to do so throughout, and I shall try all I know to prove my theory of heat to be the correct and only theory that will stand investigation.

Now, we know the poker to be red-hot. Where did the heat come from, for you cannot have something out of nothing? If it is only heat, did it come out of the coals? I say no, it did not; for there is no more heat in a ton of coals than there is in a ton of flint stones. When the fire was lighted you started a chemical process called combustion, and in that process the following actions go on:—1st, the oxygen gas of the atmosphere combines with the carbon of the coal, and it produces carbonic acid gas, a heavy gas weighing 1½ oz. to the cubic foot; oxygen gas weighing 1 oz. to the cubic foot. When the oxygen of the atmosphere combines with the carbon of the coal and produces the above gas heat is liberated. I will give further particulars of carbonic acid gas at some future time, for I am afraid of making this letter too long. Other portions of the oxygen gas of the atmosphere combine with the hydrogen of the coal, the solid hydrogen of the coal combines with the solid oxygen of the oxygen gas of the atmosphere, and water is produced, and the heat that was chemically combined with the solid oxygen in the atmosphere is now liberated, and if liberated in a close furnace it would be at a heat above 4000°, but in the generality of fires the heat is taken away so rapidly by surrounding bodies and by radiation in all directions that common fires only produce about 1000°. Thus you see the heat to make our poker red-hot came out of the atmosphere, it was chemically combined with the solid oxygen of the oxygen gas of the atmosphere, proving the oxygen gas of the atmosphere to be a compound, and to consist of solid oxygen and heat chemically combined. I think it is plain enough for anyone to see that the heat required to make the poker red-hot was not generated at all by molecular motion or mode of motion; heat is a material, and cannot be generated or made; it can be concentrated and liberated, and with respect to the red-hot poker and the mode of motion and molecular motion theory, if we had to wait until the above process made the poker red-hot we should have to wait forever. The material heat was liberated and our fire was up to 1024°, and the poker got red-hot because it was in the hot place called a fire, and such fire was up to the above degrees of heat, mechanically mixed.

* The particulars of this and every other mine in this county may be gleaned from my pamphlet, entitled "The History of the Cardiganshire Mines from the Earliest Ages, and Authenticated History to A.D. 1874, with their Present Position and Prospect." Price 2s. 6d.—London: MINING JOURNAL Office.

sterling yearly as dues. Great West Van is in as good a position now as twelve months since, or rather better. West Esgair Ile is opening out courses of ore which I should think must leave a considerable profit in working. Little has been done in Bryn Glas, but machinery has been purchased to erect on it. Illynlimmon as it was. Llywernog has gone into other hands, who will, I believe, make it a paying concern; the change, therefore, is for the better. Clara Consols without alteration. Powell Consols; the ore ground has been worked at a profit and excellent courses of ore laid open. Water machinery is erected where steam was used, and this is now a good mine, and will soon be giving very handsome dividends. Great credit is due to the managers and proprietors of this mine for bringing in an abundant supply of water to this and, in fact, to the other mines in the neighbourhood, which can now be worked very economically in comparison to working by steam-power. This mine twelve months ago was doing but little, therefore a great change for all concerned in it and the prosperity of the locality has taken place.

At East Llyn Teify little has been done, which is to be much regretted, for a small capital would give it an effectual trial, which it most richly deserves. At Llyn Teify good ore has been opened out on the south lode. Capital is being raised to work it effectually, and a successful result, according to my opinion, is a certainty. Aberystwyth mines are returning about the same quantity as for some time past. Ystumtean old mine is being cleared, and some good ore ground laid open. Cegwyn has improved in depth, and will continue to do so. I consider the mine looking better than it was twelve months ago. At South Bwadrain during the past twelve months a new water-wheel, 30 ft. in diameter, 3 ft. 6 in.

embrace the purchasing of shares in promising mines. One thing is obvious, that the present system of selling at enormous sums, whether in cash or shares, to companies, and declaring dividends out of sales of ore that in reality has not paid the cost of producing it, must cease.—*Aberystwith, Dec. 10.*

GALENA.

MINING ASSOCIATION FOR SHROPSHIRE.

SIR.—There can be no question as to the benefits that would be derived could such an association as that recently recommended in the Journal by Mr. Jasper More be established for Shropshire. To the list of subjects enumerated by Mr. More for periodical discussion might be added papers on practical geology, such for example as the formation of veins, the probable processes by which they may have been filled, the characteristic properties of productive and non-productive lodes, the analogy between the contents of a vein and the country rock, &c. There might also be discussions as to the most approved mining machinery for general or special purposes, whilst an interchange of ideas upon the best systems of ore concentration, rock-boring, and on explosive materials, &c., could not fail to be beneficial to all taking part therein. If Mr. More would consent to receive the names of those connected with the Shropshire mines who are desirous of becoming members of the proposed association it might perhaps result in some decided move being made.

Shropshire, Dec. 8.

MANAGER.

ROMAN GRAVELS MINE.

SIR.—Being a shareholder in and acquainted with this mine for several years, I was interested in reading the letters in the recent Journals thereon. Your correspondents comment on Mr. Tredinnick's remarks upon a falling off in dividends in the lead mines of Wales, including Roman Gravels. I hope you will allow me to remind my co-shareholders that the first four dividends paid by the Roman Gravels amounted to 12,000/-; the second four dividends, 16,800/-; the third four dividends, 20,400/-; also that notice has been given of 5100/- payable on the 23rd inst., towards the fourth series of dividends. From my knowledge of the property, it is apparent to me that the promises of the directors for the future will be as ably sustained as in the past. I would also remind my co-shareholders who have not availed themselves of the privilege of seeing the mine that, to use our manager's phraseology, "lanes of lead ore ground are to be seen in Roman Gravels" to an extent and value few of your correspondents have had the good fortune to enjoy. The new shaft now ventilating the mine to the 65 fm. level will be holed to the 80 fm. level in six months, and to the 95 fm. level by February, 1876 (see Capt. Water's report of the 5th instant). The machinery at the floors is capable of dressing an immense quantity of lode-stuff, and when the shaft is complete the monthly returns of lead may easily be increased to 400 or 500 tons.

A NON-SELLER OF ROMANS.

SOUTH CONDURROW—CAPTAIN VIVIAN.

SIR.—For the past two or three years there has been an inclination to supplant old and tried agents for new ones, as at North Roskear, Carn Camborne, South Crofty, New Dolcoath, and Wheal Seton, and the results are call-paying or suspended mines; but the latest and most flagitious ingratitude has been manifested towards the managers at South Condurrow. Messrs. Vivian commenced operations here on a limited scale, but persevering labour, combined with experience and wisdom, discovered a large and rich lode; they then erected powerful machinery, and laid out dressing-floors where tin ores can be prepared for the market as cheap, if not cheaper, than most mines; and they have also opened the mine underground in a way which even the most prejudiced cannot condemn, and just as they hoped to reap the reward of years of untiring labour they are dismissed; and for what? Echo answers, "Naught."

Capt. Joseph Vivian has been taking a prominent part in mining affairs for the past 50 years, and his fame is interwoven with the very existence of hundreds of our old miners in this and other localities, and his name is being handed to posterity under the "humble, yet not inglorious" epitaph, "The friend of all." Capt. Vivian's employees worked harder, and obtained better remuneration; and they were always pleased to see him, as he had always something satisfactory to tell them; he was always ready with his advice when solicited; always encouraged manliness, and hated cringing, fawning insinuations; he was one who had unparalleled chances of acquiring wealth; one in whose constitution was mettle (not India rubber, as is too frequently the case with mine agents and inspectors now-a-day); one who did not add or detract from the truthfulness of a report by an extra 1/-; one who has speculated freely and largely of his income in mining explorations; one who has never been slow to adopt improvements in mining. Such is the man who has worthily stood at the head of Cornish mine managers who has filled important posts, and whose honesty and veracity has never once been doubted, and whose services are peremptorily dispensed with without a charge or blot, save the non-vindictive blur of "driving too many cross-cuts."

Mr. Weston, the Chairman of the special meeting of Dec. 2, may even envy the Messrs. Vivian in their downfall, as they have the satisfaction of doing their duty to the utmost (although not reciprocated by 10 or 12 shareholders), whilst Mr. Weston cannot but feel "joyous" at seeing his speech reported. In his exordium he rather sided with the Messrs. Vivians, then stated his intention of being neutral, then voted against them, and finally hoped it would not injure them, as he believed them to be thorough miners, which is an equivalent to kick and hope you are not hurt, or pouring water on you and hoping you are not wet. I think Mr. Weston would make a kind, tender-hearted (yet unskilled) physician, he knows nothing about diagnosis, but seems to be an adept at cataract.

EDWARD SKEWIS.

SOUTH CONDURROW MINE.

SIR.—Mr. Waddington states in his last letter that I accuse him of misrepresentation, and that it may have suited me on the eve of South Condurrow meeting to make him appear a liar, if in my child-like innocence I believe an untruth to be a misrepresentation. I have nothing to retract, nor is an apology required from him; but the word liar I hate, and I should have hesitated a long time before I applied the term either to himself or any other person—if, however, he likes to do so to himself I can have no objection. He then goes in for the champagne business again, and I feel ashamed any man, especially a man of such magnanimous ideas as Mr. Waddington, could find a handle to make use of in such a trumpery matter. The facts, in a few words, are simply these—his friend, Mr. Vivian, will put me right I have no doubt if I err:—Some four years since, talking over the appearance of the mine after attending one of the meetings, Mr. Vivian said the mine was looking much better, and we should soon see shares 5/- each, and ultimately he believed they would reach 10/-, or even 20/- per share. I made answer as soon as they got to the former price I will send you a dozen cases of champagne to drink success to the mine, and if they ever reach 10/- I will send you a three-dozen case, and if I ever live to see them 30/- each you shall have a six-dozen case. Shortly after they reached that price, and I duly sent on the wine. Time passed on, and they reached 10/- per share, the consequence being I redeemed my promise by sending him a three-dozen case; and, as I look upon my promise, perhaps, in a more sacred light than Mr. Waddington may do, if they ever should reach the latter price I hope I shall not be found wanting. These are the plain facts of the little mole-hill which Mr. Waddington has tried to convert into a great mountain. At this time I believed the mine was being worked for the benefit of shareholders; since that time, however, I have had cause to entirely change my opinion; and although my conscience may be a little more elastic than that of Mr. Waddington's, and although he may think that mine but mining jobbers have honest motives, I shall never regret the course I have taken.

Mr. Waddington, in closing his correspondence, with his usual kindness towards me, would leave me in the happy embrace of some friend or friend of his, who, for some deadly sin committed on Oct. 30, 1872, had been consigned to the depths of darkness, from which he has just emerged with all the colour of the sulphur regions still strong upon him, "since which he by some means has given offence to Mr. W." As I think, however, the atmosphere he breathes, and the place itself, would be more congenial to the feelings of Mr. Waddington than myself, I beg to decline his acquaintance. Mr. Waddington can enjoy his friend's society alone in his glory.—*London, Dec. 9.*

P.S.—To put "P. K. V. V." right, I must tell him I was never on the mine in my life with Mr. Fraser.

OLD TALARGOCH MINE.

SIR.—Mr. Colyer is right. It is folly in the extreme for men to invest their money in American notions, which have yielded only mortification in nine cases out of ten. The mine he speaks of I was surprised to find advertised as sold to a new company. I know it has in the past yielded fortunes to its former possessors, and it seems unaccountable only that a series of disasters came upon them and they had not any reserve, having paid away all they earned in dividend, without

thought of the proverb about a rainy day. The appellation the "Great Talargoch" is a correct one, for it is great in all senses, great in size, great in richness, great in the enterprise of its owners, and under the new management it will I trust be a greater wonder still. That they have scope and means to open out the mine is at once a certainty of success, and with the economies alluded to by Mr. Colyer a bright future is before the shareholders. I fully expect that early investors here will be in the position of the first holders of Van, Minera and Caradon shares. As the allotment is made with 2/- paid-up the fortunate holders can realise at a premium at once; but I should advise "hold back," as, if I am not awfully deceived, the price will be doubled in a short time. It is only once in a lifetime that such a mine is in the market.—*Chefchord, Cheshire, Dec. 9.*

T. S. BARRETT.

WEST CHIVERTON MINE.

We have been requested to publish the following letter, which was addressed and has reference to the *West Briton*:

SIR.—On reading your remarks on the late management of the West Chiverton Mine, which appear in your publication of yesterday, I am much surprised to find that you have included the name of Capt. Nancarrow with that of Mr. Clegg, Capt. Juleff, and the other officers dismissed, for I think you cannot but be aware that Capt. Nancarrow was never discharged from the service of the West Chiverton Mining Company; and I beg to say that we have the greatest confidence in him, and have received many testimonials in his favour.

Also, in your report of the special meeting held on the 1st inst. you make me say there is but one proxy against the committee. What I did say was there was not one.—*Tiverton, Dec. 4.*

THOMAS SMITH, Chairman of Committee.

SOUTH WHEAL FRANCES.

SIR.—I should say that after such a convulsion of Nature as must have occurred with Capt. Richard Goldsworthy in his efforts to annihilate the agents of this mine that if they are not vanished I feel assured they must feel under a cloud—how can you survive such a vigorous onslaught? Possibly, however, the agents are men of common sense, and do not understand such a volcanic eruption as that fired at them in last week's Journal. Although I am not personally acquainted with either Capt. Goldsworthy or the South Frances agents, my object in calling attention to Capt. Goldsworthy's remarks is to suggest that mine agents should be more charitable to one another. There is now-a-day too much covetousness or undermining, that of one agent trying to supplant another. First by an adverse report, then by promises that there is no probability of being carried out. If those clever agents would go and take a grant of a new piece of mining ground (of which there is plenty), and open up a good mine by their own ability and judgment, it would be more to their credit. Although even then they would not be safe in their success, as some large shareholder would soon want the agency for a *protégé* of his own. Such is my experience.—*Dec. 9.*

A. CLARKE.

ST. JOHN DEL REY MINING COMPANY.

SIR.—In the Journal of last Saturday the following paragraphs appear:

Page 1327: "The directors have declared a dividend of 10 per cent. for the half-year, payable on the 24th inst., after carrying 10 per cent. thereon to the reserve fund."

Page 1328: "It is proposed to pay a dividend of 10 per cent. for the half-year ending Nov. 30, being at the rate of 20 per cent. per annum, and to carry forward 10 per cent. on the capital to the reserve fund."

The first named is in substance correct. The dividend will be 10 per cent. on the capital, and 10 per cent. on the dividend will be carried to the reserve fund.—*Tokenhouse-yard, Dec. 9.*

JOHN HOCKIN,

Managing Director.

RICHMOND CONSOLIDATED MINING COMPANY.

SIR.—I have to apologise for allowing Mr. Bridgwater's reply to my former letter to pass unnoticed. That communication, however, does not in any way meet the points I have raised, nor the question how it happens that the Rev. Mr. Probert was so sensational sanguine about the wondrous riches of the property of the Utah Mining Company, which before any returns whatever were made proved an utter fiasco. Will Mr. Bridgwater explain how it comes to pass that the Rev. Mr. Probert, after having publicly offered to make the Utah Mine a success, if he were only permitted to assume the management, refused to accept the position when the offer was made? Smelting the "enormous deposits of rich galena" was, according to Mr. Probert, the only salvation of the Utah Company. But the awkward question now is—Where is the ore? *Vide* Mr. Longmaid's letter in last week's Journal.

It is natural enough, no doubt, that Mr. Bridgwater should appear as the champion of Mr. Probert. As Mr. Probert's brother-in-law, no one can be better able to afford information upon this point than Mr. Bridgwater.

It will probably be in the recollection of some of your readers that about this time last year I was sadly abused by Mr. Postlethwaite and others because, in my simplicity, I ventured, as a shareholder, to take some exception to the financial policy of our board. Although since then some remedial steps have been taken, yet I still submit that the declaration of dividends by the anticipation of profits—for that is practically the case—is only a continuation of the policy I complained of last year.

At the recent meeting Sir Leopold Heath endorsed all that I had put forth 12 months since, and the explanations of the Chairman were, at least to my mind, anything but conclusive.

Dec. 8.

A SHAREHOLDER.

NEW QUEBRADA COMPANY.

SIR.—I must crave your indulgence to be allowed to offer a short answer or explanation of the letter which appears in last week's Journal from a correspondent at Southampton. He states that "he had ventured to seek for information from the fountain head, but had not been vouchsafed a reply." From this expression it would naturally be inferred that he had written to the company's office, and that the secretary had not answered his letter. I feel, therefore, called on to admit that I am the sole delinquent, and am bound to relieve a valued officer of the company from the implied censure, adding that I am sure that no shareholder ever applies for information who does not receive a courteous, even if not always a satisfactory, answer.

Your correspondent wrote to me, which he had frequently done before, for information, and, I think he will admit, never previously without receiving an answer, which may have caused him the more to notice the absence of one on this occasion, which arose solely from extreme pressure on my time from other Venezuelan business, as well as Quebrada affairs.

I must, however, defend myself and co-directors from the charge of "broken promises" as regards a meeting expected to be held in October last. My friend, "An Original Shareholder," is rather in error as to any such promise. What was stated was that by the Articles of Association a meeting should be held in October, but as that would tread so closely on the heels of the one then being held (in August), we promised that another should be held before the end of the year. This promise we are fulfilling, as within a few hours of the time when this letter will appear the shareholders will receive a report from the directors, with a notice convening a meeting for the 29th inst. It is somewhat later than we intended, but has been a little delayed to enable us to announce the gratifying intelligence that the termination of all litigation (a blessing which the New Quebrada Company has never previously enjoyed) is now *un fait accompli*.—*Moorgate-street, Dec. 11.*

FREDK. H. HEMMING.

THE NEW QUEBRADA COMPANY.

SIR.—I readily endorse every word written by "An Original Shareholder" in last week's Journal. I am afraid between the two boards that the Quebrada interest is to some extent being sacrificed to that of the Bolivar Railway. Rumour says that the Bolivar Railway board is in a fix, and cannot "come to time," but I think this should be no excuse why we should not know the particulars desired by "An Original Shareholder," which appear to me to be perfectly reasonable and just. I have for years supported Mr. Hemming, upon the conviction that half-yearly meetings were indispensable. Undue reticence in public companies is always undesirable, and in the present case I cannot but think reprehensible.

London, Dec. 8.

ANOTHER ORIGINAL SHAREHOLDER.

THE NEW QUEBRADA COMPANY.

SIR.—What we should do without the *Minning Journal* I am at a loss to think. Through its medium we ventilate our complaints, and publish our hopes and desires. I am not at present disposed to enter into the matter of "An Original Shareholder's" complaint, which appeared in last week's Journal, but I would adopt the same means to ask my old friend, Mr. Hemming, why he does not condescend to reply to his enquiries. I have every faith in our vice-Chairman, and feel confident that nothing will be left undone so far as he is personally concerned, but I would again remind him that the disaffection is being widely spread.

London, Dec. 8.

A LARGE HOLDER OF ORIGINAL SHARES.

[For remainder of Original Correspondence, see to-day's Journal.]

Meetings of Public Companies.

CRENVER AND WHEAL ABRAHAM UNITED MINES COMPANY.

The ninth ordinary general meeting of shareholders was held at the City Terminus Hotel on Thursday.—Mr. STRATTON in the chair.

Mr. GEORGE H. CARDENZO read the notice convening the meeting. The report of the directors stated that in the last directors' report to the shareholders it was mentioned that the output of copper ore for two months amounted to 342 tons, whereas the five bi-monthly samplings since that time have amounted to 2380 tons, showing an average output of only 476 tons bi-monthly produced; the increase of the last returns of ore for two months over the corresponding months last year being 301 tons, amounting in all to 553 tons, instead of 232 tons. There is at present sampled on the mines limestone worth about 2400/-, besides a considerable quantity of tinstaff, which of which has not yet been ascertained. It is intended that the whole of this produce shall be sold as soon as made marketable, which the pneumatic stamps and calciner are rapidly doing in an economical and most satisfactory manner. At the present rate of working, without taking into consideration any probable increase, it is estimated that the tin at present price will yield upwards of 5000/- per annum. The discoveries of copper ore lately made in various parts of these mines have been numerous, and places formerly found unproductive are yielding copper ore on a remunerative scale. These remarks particularly apply to the course of ores opened up in the western portion of the mines, which being in whole ground are of great importance for the present, and show great promise for the future; at the same time the east has also improved, for where the lodes were productive the lodes have improved in quality and quantity, and in sinking Woolf's shaft the miners have gone through a considerable space, yielding 5 tons of rich copper ore to the fathom. At present the lodes in the bottom of the shaft yields 1 ton per fathom, but there are indications leading to the belief that the lode will shortly give as much, if not more, mineral than before.

The Crenver and Wheal Abraham Mines are valuable property, and only require a little more time and development to make the receipts far exceed the costs. The liabilities and assets are nearly balanced, and the working capital nearly exhausted, consequently steps must be taken to obtain further capital. Everything indicates that the continued working of these mines will secure future profit and great advantage to the shareholders, and the directors hope that as others not so immediately interested have already offered to assist in raising additional capital, the general body of shareholders will see the advantage of taking up their proportion of such capital, which it is proposed to raise on terms authorised by the Articles of Association, and which will be found most advantageous to their interests.

The agents' report was read, as follows:—
Dec. 9.—Setting Report: Sturt's Engine-Shaft: We have put the men to take down the north side of the 228, as we think there is more of the lode standing in that direction; during the last 6 ft. of driving the lode appears to be disordered. To drive the 228, east and west of shaft, by six men, the month, at 15/- per fathom; the lode is 1½ ft. wide, and will yield 1 ton of copper ore per fathom; this end has a kindly appearance, and we have no doubt but that the lode is standing to the south of shaft; we consider this to be a very good feature. To sink a winze in the bottom of the 215 west of shaft, by eight men, the month, at 16/- per fathom; the lode is 2½ ft. wide, yielding 1½ ton of copper ore per fathom; this end is opening out what appears to be good tribute ground. To drive the 215, west of shaft, by eight men, the month, at 16/- per fathom; the lode is 3½ ft. wide, producing 2 tons of copper ore per fathom; the lode here is much improved, and letting out water freely. To rise in the back of the level, against St. George's shaft, by eight men, the month, or hole, at 20/- per fathom; the lode is 3½ ft. wide, yielding copper ore to dress; we have about 3 fms. more to rise to communicate to the shaft, which we want to have done as early as possible to give better ventilation, and for the transit of copper ore. To drive the 200 east by two men and two boys, at 15/- per fathom; the lode is 2 ft. wide, occasionally yielding stones of rich grey copper ore, having a promising appearance. Crenver Shaft: To rise in the back of the 140, west of Harvey's rise, and east of shaft, by three men and three boys, the month, at 17/- per fathom; the lode is 3 ft. wide, worth 8/- per fathom for tin. Bull's Shaft: To sink this shaft below the 180 by six men, the month, at 18/- per fathom; the lode is 1½ ft. wide, sometimes yielding stones of copper ore; the shaft is about 7 fms. below the level. St. George's Shaft: To 203 to drive east on the south lode and west of shaft, by four men, the month, at 10/- per fathom; the lode is 1½ ft. wide, producing copper ore to dress; this end has a kindly appearance, and we have no doubt but that the lode is standing to the south of shaft; we have five pitches working in the back of this level by 16 men, at tributes varying from 5/- to 10/- in 1 ft. We consider there is equally as good a lode in the bottom of this level as there is in the back, which we cannot yet work, it not being drained. To drive the 190 east by six men, the month, at 12/- per fathom; the lode is 1½ ft. wide, yielding a little copper ore. To drive the 180, east on the south lode, and west of shaft, by four men, the month, at 8/-, 10/-, per fathom; the lode is 1

would be perfectly secure. He then moved that the report and accounts be received and adopted.—**MR. BARLOW** seconded the proposal.

MR. H. GREEN said the company was obviously insolvent, and enquired what proportion of the 7000 arrears on allotments and calls could be considered really an asset. Instead of encumbering the machinery and plant as proposed the better course would be to voluntarily wind up the company.

The CHAIRMAN did not exactly see how the directors could say that any portion of the arrears was absolutely bad, but of that amount they were certain to recover at least 5700, without difficulty.

In reply to further questions, the CHAIRMAN stated that the copper sold last week had not been included in the accounts now submitted—that was an asset, with a further cost as a liability. The item of 575, had been written off to the forfeited share account; the call of 2/- per share was made not upon 50,000, but upon 49,500, the difference in the account was the calls actually made on them before forfeiture.

A SHAREHOLDER asked whether the sales of ore made last week by the mines referred to by the Chairman were bi-monthly?—The CHAIRMAN said they were mostly bi-monthly, West Tolgoe excepted; this mine, formerly in a worse position than Cremer, recovered, a large amount of copper having been found, and it is now paying regular quarterly dividends.

A SHAREHOLDER would like to know the prospect there was of the returns overtaking the costs, which were now at the rate of 25,000/- per annum, as against 8000?—The CHAIRMAN said, in mining operations the main thing to do was to find out whether they really possessed what they had been looking for, and to employ as many men as possible to open out the ground quickly. In a property like Cremer it would be very easy for them—if they carried on operations in that way—to have 150 men at work instead of 340, and at once bring the mine into a paying state, but more certain ruin could not possibly take place. If it took a year and a half to build a house, it would scarcely be fair to call that so much loss of time, and here they were excavating ground in order to enable them to get out with profit that which, lucky for them, had been found near at hand, because in the west very large discoveries had been made, and it required a very small expenditure to put the mine into a thoroughly paying condition. He believed the mine to be perfectly capable of returning four times the quantity of ore at present being returned. He told them at the last meeting that the returns of 342 tons would not go down, and now he told them that 543 tons should not only not go down, but that the amount would progressively increase. They had a very large sett situated in a highly metalliferous district, teeming with mineral, and it only required capital to bring those minerals to surface to make Cremer a very profitable concern.

Sir CHARLES WINGFIELD said unless it could be shown the receipts would exceed the working expenses the prospect of raising more money did not appear very encouraging.

The CHAIRMAN said when at the mine last week he made a calculation as to what was necessary to be done for the thorough and economic development of the mine. The stamps and floors required an expenditure of about 5000. Pelly's engine-shaft required a new boiler, which would cost 2000/-, by which a great deal of coal would be saved. A new cylinder was required at Williams's shaft, which would cost about 1000/-; and sundries for wire-ropes, &c., about 2000/-, sinking Williams's shaft and providing pitwork, 2000/-, by which a saving would be effected of 700/- a year. The CHAIRMAN said he should think they would be 30,000/- for the next year, against which there would be returns of copper to the value of 1500/- to 1600/- per month, and tin to the value of about 400/- per month.

Mr. MARSH (a director) mentioned that the current expenses so nearly approximated the returns that any discovery would at once make up the difference, and there were good reasons to believe they are on the verge of very great discoveries.

The CHAIRMAN said if the shareholders would put in a little more money he believed the shares would soon advance to par.

Sir CHARLES WINGFIELD said the shareholders were greatly indebted to the Chairman for the great attention he had given and time he had spent on the company's affairs, but he should like to know what were the prospects of increasing the returns?

The CHAIRMAN said the expenditure of the amount now proposed would, according to the belief of those who were authorities in the matter, make it a good paying concern. As he had already indicated, they did not purpose to expend anything like the whole of the 20,000/- of it 5000/- would at once be put in to meet the interest for two years.

Sir CHARLES WINGFIELD said he was rather disposed to support the proposition for the additional capital, especially if he could be satisfied as to the progressive increase of the returns.

Mr. HORACE GREEN, after some further discussion, moved (as an amendment to the adoption of the report), that the company be wound-up voluntarily.

Mr. WILKINSON seconded the amendment.

Upon being put three hands were held up in its favour, and a large majority against it, when the motion for the adoption of the report was put and carried.

Mr. RAWLINGS said it was clear that either the mine must be abandoned or the necessary capital supplied. He and his partner would endeavour to take some of the debentures, and he thought when opened out the mine would be a good and paying one.

Some discussion ensued, resulting in an understanding to leave the directors entirely unfettered, so as to raise the necessary money as in their estimation would be considered most advantageous to the interests of the company.

A vote of thanks to the Chairman and directors closed the proceedings.

ASSHETON MINING COMPANY.

An extraordinary general meeting of shareholders was held at the offices, Bartholomew House, on Monday, to consider, and if approved, to pass, one or more of the following resolutions:—That it is absolutely necessary that funds be provided in some way to enable the operations at the mine to be continued. That the directors be empowered to provide the requisite funds, either by sale of a portion of the sett, or by the creation of further shares, on such terms as the meeting may direct. That the company be wound-up voluntarily under the provisions of the Companies Act.

Mr. W. NEWLAND RUDGE in the chair.

Mr. H. WILSON (secretary) read the notice convening the meeting. The directors in their report appealed to the shareholders to subscribe money on mortgage debentures; but, this appeal having been only partially responded to, they have no other alternative than to call a meeting of the members to discuss the position and prospects of the mine. Shareholders are earnestly requested to attend, as the present direction is, in the face of the want of confidence betrayed by the shareholders, anxious to be relieved of its responsibility.

The CHAIRMAN said the business of this meeting was not of a very pleasing character. The application for debentures was not responded to beyond 4000/- to 5000/- as far as the shareholders were concerned, although the directors and their personal friends had increased that amount to 11000. The directors took the largest number of shares sometime since at 4/- per share, and had otherwise financially assisted the company; but they could not continue to do so if the shareholders did not come forward and assist themselves. The directors now asked the shareholders to express their opinion as to the best means to be adopted to carry on the company. If the shareholders were inclined to assist the board they were quite prepared to perform their part, although they had privately advanced money to keep on the company. The value of the mine was beyond all question, and it was provided with valuable plant and machinery. It had been suggested that the best plan to obtain the necessary additional capital would be to dispose of a portion of the property, offering the present shareholders a *pro rata* interest. The Tan-y-Bwlch Mine, adjoining Assheton, had expended upon it by its private owners some 10,000/- before any remunerative returns were made, but the mine was now returning 100 tons of lead per month—at a distance of only 40 fms. from the Assheton boundary the lode in Tan-y-Bwlch was worth 100/- per fathom. No doubt the ground between the present workings and the Tan-y-Bwlch boundary, although as yet undeveloped, would prove one of the best portions of the Assheton Mine, and if it were agreed to dispose of it the only conditions should be that the present Assheton shareholders should have the prior option of securing an interest. Unless some decision were arrived at to provide additional capital the alternative would be to pass the third resolution for the voluntary winding-up of the company. He then moved that it is absolutely necessary funds be provided in some way to enable the operations at the mine to be continued, and that the directors be empowered to provide the requisite funds either by sale of a portion of the sett, or by the creation of further shares, on such terms as the meeting may direct.

Mr. H. D. BROWN seconded the proposition. This resolution really provided the alternative of selling a portion of the mine to a new company, or raise the necessary capital by debentures. He had given the matter a considerable amount of thoughtful consideration, and, as a result, prepared a scheme for the disposal of a portion of the western ground to a new company. The difficulty was that as the best portion of the mine would have to be sold to another company, how could it be at the same time retained to the present shareholders? He proposed that they should be paid one moiety in shares and one in cash, by which an interest would be retained, while capital would be provided to work the entire property. His scheme was that the western ground should be sold to a new company for 7000/- to be paid 3500/- in cash, and 3500/- in 1/- shares, the latter to be allotted to the present Assheton shareholders as with 10/- per share paid. He proposed that the capital of the new company should be divided into 14,000 shares of 1/- each, and he thought there would be no difficulty whatever in placing the 7000 shares among the directors and their friends if the Assheton shareholders did not take them. The 7000/- thus provided would enable them to sink the shaft upon the valuable lode now being so successfully opened out in Tan-y-Bwlch, and the 3500/- paid in cash to Assheton proper would enable the liabilities—amounting to some 12000/- to be cleared off, and the mine to be developed in the manner which its merits deserved. Both concerns could be carried on as one concern, with one direction and one manager—so that in this respect the expenses need not be increased to any appreciable

extent. They had corroborative testimony on all hands that by the present mode of working great riches could not be reached or success attained. The mine was being worked to a great disadvantage, but he believed by the carrying out of the scheme he had shadowed forth the entire mine would be properly and successfully developed, and the shareholders have a fair chance of seeing their property command a market value far different to that it now occupied. The directors were perfectly prepared to do their share if the shareholders would co-operate in the scheme, and they felt satisfied that by so doing substantial dividends would yet be received by the Assheton shareholders. (Hear, hear.)

Mr. W. GUNDREY (a director) submitted the following report:—

Dec. 4.—Agreeably with your instructions, I have inspected this mine. The following is my report thereon. Mawr's shaft is sunk to the 50 fm. level on the course of the east and west lode, which has an underlie of (say) 20 in. in 1 fm. north; the character of the rock, blue clay-slate, and also the fissures passing through the same, is most favourable for the growth of ore in large quantities. The 50 fm. level is extended east 3 fms. in a large lode; the first few feet discovered a nice bit of lead are cropping up out of the bottom; it looks like the top of a deposit of ore. The lode in the end is showing spots of ore only. The 50 is driven west 14 fathoms through a large lode, composed of quartz, mica-schist, and lead, presenting a very cheering appearance. The lode in the forepart is 6 ft. wide, with a mixture of blonde and lead, saving work—a nice lode. From the indications here I think you will come on a good lode soon—the surrounding rock indicates it. I have a doubt on my mind that the main ore-bearing part of the lode is standing in the south side, which can soon be proved by a short cross-cut. The 40 west is driven 3 fms.; here the lode is divided by a horse of 3 fms. wide. The 40 east is made a good distance, the first 13 fathoms on the north part of the lode, at which point a cross-cut was put out 8 ft. to the south part, which I call the main ore-bearing part of the lode; here a fine course of lead ore was discovered for (say) 13 fms. in length; it is now being stopped below the said level, yielding 1, 2, and 4 tons per fathom—an average, I set it down at about 3 tons per fm. The water is being drained from the said stoppage by means of a hand pump. It is this part of the lode that I rather think is standing in the 50 below. Brown's shaft is west of Mawr's 56 fms., and sunk to the 40 under the lode. The 40 is driven west of shaft from 15 to 20 fms., and a good shoot of ore was laid open. The stoppage in the back of the said level is worth 1 ton of lead per fathom, with a mixture of blonde. A cross-cut should be put out here to prove whether there is any more lode standing south just under the said stopes. The 30 is driven west 26 fms.; at a point 3 fms. from shaft a good lode was discovered, and continued more or less ore for nearly 15 fms. in length. No. 1 winze has been communicated with the 40, which is apparently cut down on the north part of the lode, producing ore in paying quantities. In the bottom of the 30 a stoppage is at work about the said winze, where they have been engaged shooting out the south part of the lode, which so far as can be seen is looking well—worth 2 tons per fathom. I need not make any comment on the other old workings; but I am bound to say that it appears quite clear to me that you have a fine property if worked in a miner-like manner, but by the present mode of working the mine can never pay unless the vein proves more than ordinarily rich. You have been working the ore ground and exhausting the ore before your levels can be brought into play to use any economy. You are working underneath pumping water by manual labour, drawing and filling staff two or three times over before it reaches the dressing floors. You will distinctly understand me that I lay no charge to the agents; it appears to me that they have no choice in the matter. Ore must be got out if it cost 30s. to get 20s. worth, and by this mode of working I need not tell you that the company must come to grief. I strongly recommend you to stop all dressing for (say) six months, and prosecute the several bargains as below. The 60 west by six men. The 50 east to intersect the north and south lode by four men. The 40 west to communicate with Brown's by six men; and a pare to cross-cut in the 40, at Brown's, by four men. If nothing is met with here those men could be put to sink a winze in the bottom of the 40 west in the great run of ore; this done, and bring the mine into working order, you would be in a position to meet expenses at once, even if no other discoveries were made. That number of men can be worked for 250/- a month. A new shaft should be sunk in the western ground, which would increase the expenses (say) 50/- a month, including timber, &c.—making the total expense (say) 300/- per month. The rich Tan-y-Bwlch lies directly west, and contiguous to your mine, on the same vein, where they have opened out a rich and continuous course of ore for upwards of 100 fms. in length. This mine was poor until they reached the present bottom level, I think the 60, and, judging from what has been done, it looks plain to me that the bunches of ore in Assheton are no more or less than the outcrop of the great bunch of ore that will be found below—such is my opinion. The vein here going west the lower ground is embedded in a dark clay-slate, of a shaly kind; below the kind of rock the Tan-y-Bwlch became rich. If ever you find a shaly bed of ore you may rely on rich courses of ore both below and around it, and it is with this and with the favourable surrounding rock, and the matrix of the vein in Assheton, that I am compelled to speak with such strain on your mine, truly believing if sufficient money is found to bring it into good working order that discoveries will be made at an early date to place it in a highly profitable state.—T. HODGE.

A SHAREHOLDER thought it a great pity this capital could not be raised without dividing the property.—Mr. BROWN said the directors had already tried that course, and it had failed.

The CHAIRMAN said he held 800 shares, and the Messrs. GUNDREY between 2000 and 3000, and the other directors also held largely, and all were quite willing to subscribe their proportion of the new capital if the shareholders would come forward and assist.

The SECRETARY, in reply to a question, stated that the liabilities amounted to nearly 12000. In the earlier part of the year the operations resulted in a small profit, and in April and May the profit was about 200/- per month, but since then there had been a loss of from 200/- to 300/- per month.

Mr. BROWN, in reply to a question, stated that by the scheme he had proposed the Assheton shareholders would receive 3500/- to continue the development of Assheton proper, and 3500/- in shares—that is, 7000 shares with 10/- per share credited as paid, and the proportion would be one for every two shares at present held. The new company would have 7000 shares of 1/- each to allot, which with the 10/- per share on the 3500/- to be allotted to the Assheton shareholders would provide a cash capital of 10,500/- for developing the western end, and 3500/- for continuing the explorations at Assheton proper. There would be no difficulty whatever in placing the shares supposing they should not be taken by the present Assheton shareholders.

A SHAREHOLDER said they had no evidence before them of the value of this western ground. They were proposing to sell it for 7000/-, whereas it might be worth a considerable deal more.—Mr. MATTHEW GREENE said there could be no doubt as to the great value of this piece of ground, and it was a great pity the Assheton shareholders had not come forward and subscribed the necessary funds for its vigorous development.

After some further discussion the resolution was put and carried unanimously.

Mr. WISE proposed that the proposition that the scheme as laid before the meeting be approved, and that the directors be requested to take the necessary steps to carry it into effect.

Mr. TROTTER seconded the proposition, which was put and carried.

Mr. MATTHEW GREENE proposed that the best thanks of the shareholders be given to the Chairman and directors. Their Chairman, host of strength in himself, had stated that he was prepared again to come forward and assist in ensuring the full development of the mine. They all knew he had a great deal of financial power, and that his example would stimulate others, and that the directors had also expressed their willingness to provide more than their proportion of the additional capital necessary. He proposed that the best thanks of the shareholders be given to the Chairman and directors.—Mr. FLETCHER seconded the proposition, which was put and carried.

The CHAIRMAN, on behalf of his colleagues and himself, thanked the shareholders for this renewed mark of confidence. They would continue to do all in their power to ensure success.

A considerable number of shares were taken in the room, and the directors pledged themselves that any shares not taken up by the present shareholders upon their *ratio allotment* should be again offered to them before going to the public.

The meeting then separated.

GREAT FRON FOWNOG CONSOLIDATED LEAD MINING COMPANY.

The ordinary general meeting of shareholders was held at the Clarendon Rooms, Liverpool, on Nov. 30 (Mr. DAVID DAVIES, Chairman, in the chair). The SECRETARY having read the notice convening the meeting, the following reports were submitted:—

Nov. 20.—The directors report that since the last ordinary general meeting the works have been carried on with great energy and perseverance, and that after using every exertion in sinking the new engine-shaft the flat was reached on Sept. 18, and after driving a cross-cut in a north-westerly direction for about 3 yards, they met with a few yards of the day level; but they are glad to say that by increasing the speed of their powerful engine they have been able to steadily reduce the water in both the new and old shafts, and they have now no doubt of being able to completely drain them in a short time. The directors have also to state that, to find the capital would not be sufficient to carry out the undertaking, they deemed it advisable to appeal to the shareholders, and at the extraordinary meeting of the company, held on May 15, the capital was increased by the creation of 1000 new shares of 5/- each, but it was understood that only 500 of the said 1000 shares thus created should be then issued, and the directors now ask authority to issue the remaining 500 shares on the terms and conditions stated in the aforesaid resolution. The total capital of the company is now 35,000/-, in 7000 shares of 5/- each, of which 6500 have been allotted up to the present date, leaving 500 shares still to be disposed of. The uncollected capital of the company on the shares already allotted amounts to 820/-.

The directors call special attention to the engineer's and agent's reports of the works, carried on under their respective directions, and although the directors have experienced many difficulties in the prosecution of the works, they are still of opinion that are long their patience and perseverance will be rewarded with success. Every possible economy has been used consistent with the proper conduct of the works. The directors again decline receiving any remuneration for their services for the present.

Nov. 17.—From the date of my last report the sinking proceeded from a depth of 122 yards to a depth of about 150 yards, when it became necessary, from considerations of safety and suitability of position, to fix the second 24 plunger; this was finished, and the pump successfully started on Aug. 5. The water below the first plunger was conducted into the cistern of the lower plunger, and lifted thence to the upper cistern, from which the plunger pump raises it to the adit level. The sinking then recommenced, the water in the bottom of the shaft being raised by the use of the 15-in. sinking pump into the cistern of the lower plunger. The sinking was continued, and the flat was found at a depth of about 159 yards; during the latter part of the work the pumps were worked at 2½ strokes per minute. Your manager then commenced to cross-cut to meet the runs of ore, and at a short distance from the bottom of the shaft cut into the water-bearing strata, from which the water issued with such violence as to fill the new shaft to the water level of the old shaft in a very short time. The pumps were then increased in speed up to 10 strokes per minute, and have since been raised about 9000 tons of water per day. The discharge of this large volume of water has very considerably reduced the water level, and taking into consideration that we have now most probably nearly drained the water from the old workings, the remainder of the drainage may be expected to proceed with increased speed. I may further state that the pumping machinery has stood the severe test to which it has been subjected in a very satisfactory manner, and the whole of the plant of the mine is in an efficient state.—W. C. PAGAN, C.E.

Fownog, near Mold, Nov. 16.—In handing you my report of the work performed during the past 12 months, I beg respectfully to state that the new engine-shaft has been sunk 38 yards 2 ft. 6 in., making the shaft now 117 yards below the day level, and 167 yards below the present top of the shaft. The 38 yards 2 ft. 6 in. consisted

of, first, 9 yards 6 inches of limestone of the little flat, making the total thickness of the little flat 16 yards. We then had a series of beds of sandstone for 14 yards, then a solid bed of sandstone without any parting for 5 yards, then 8 yards 6 inches in thin beds of sandstone on the top of the main flat, then the flat, 1 ft. of shale, and the last 2 yards 6 inches in the limestone of the main flat. For upwards of 50 yards we had small strings of ore, of a very fine quality, running down through all the beds of ground, and which I was of opinion would lead to a run of ore right under the shaft, but when we reached the flat it was found to be poor, but the strings of ore continued to go down into the limestone of the main flat. As soon as the shaft was sunk to the above-named depth, I put 12 men to drive a cross-cut south-east (on the flat), and drove 3 yards from the shaft where the flat in the end is about 1 ft. thick of shale, and from its appearance, and the dip of the flat and other indications, I think we shall not have to drive many yards before we shall cut into a good run of ore, and I propose to continue to drive the cross-cut on to the boundary, as in so doing I feel sure that several runs of ore will be cut that have never yet been touched in any part of the set, and as the cross-cut will be a great distance from the surface and outcrop of the flat, it can be worked to a very great advantage, and, I think, to a considerable profit to the company. I also put 12 men to drive a cross-cut north-west of the shaft, where after driving 3 yards we cut into a great influx of water, and it rose in the shaft 60 yards in 30 minutes, and about 20 yards more in about two hours. From the little that could be seen of the ground when we cut into the water, and the nature of the sand that came up with the water in the pumps, I think there is not the slightest doubt but that we have cut a very fine run of ore. Since we cut into the water in the new shaft we have drained it down 30 yards in the old shaft, making it about 50 yards below the day level there, and I expect we shall have the old shaft drained

secretary's salary and office rent. After consultation they resolved upon appointing Messrs. Robert Fletcher and Co. managers, by which a saving was effected of £600. a year, and by which they secured the services of Mr. Moore, the accountant who had been sent out to Russia to investigate the company's affairs, and, consequently, had complete knowledge of the different estates. At the same time the directors attacked what was really the vital question of the whole concern—the question of finance. No end of disaster and difficulty had arisen from want of means—nothing was done at the right season. In Russia they had above all things to consider not only what had to be done, but the proper time to do it. As he had already said, they attacked the question of finance, and the first thing was to devise means for letting the management out there have funds at the time wanted, so that work might go on regularly, and without interruption. They had made an approach to the shareholders for debentures bearing interest at the rate of 8 per cent., but a very small sum was subscribed for, and the directors and their friends found the necessary funds, taking as security the copper then in transit. The advance was made at the ordinary bankers' charges, the directors feeling the great importance of placing funds at the disposal of Capt. Rickard to enable him to urge forward the work, so that now he had money in hand for the commencement of the transport season. As he had said, the money was secured upon the copper, and had been repaid as the copper was sold. About £18,000. had been thus advanced, and the whole had been repaid, with the exception of 5000/-, which remained still in copper in transit. All the copper that had been made since September remained in their stores, and would be quite a sufficient basis to supply whatever capital might be required to carry on the business of the concern at present. Beyond the fixed and debenture debt, except this sum of 5000/-, all the money they required was to pay the expenses incurred during the time the copper could not travel in consequence of the roads and rivers being shut up, and also the preparatory work for timber cutting and floating. So the company was not in so bad a condition, considering the results of the last two years. As to the value of the concern, he would give them a few facts upon which they could form their own opinion. One was that he had received a letter from a gentleman in St. Petersburg, offering to lend the company 60,000/- upon the mortgage of the property; the offer was neither solicited nor expected, but was made by a perfectly responsible man, who would lend on mortgage an additional sum of 60,000/- at an interest of about 6 per cent. In making a change of management the board had had no difficulty whatever with the Messrs. Taylor, who offered in the most handsome way to do anything the directors wished, because their chief anxiety was to see the concern put into a prosperous state; the Messrs. Taylor behaved most handsomely in the matter, and he wished to record his sense of them before all the shareholders. He (the Chairman) had been the vendor, as well as being the present Chairman of the company. Very many might think that he was to be blamed in inducing them to enter upon a property which did not produce better results. He knew they had a good concern, and worth every shilling paid for it, and would now, notwithstanding all its disasters, if wound up to-day, pay from the stock and loose plant every shilling of debt on mortgage and debenture that stood against it. The whole of the liabilities amounted to 78,000/-; debentures, 30,000/-; mortgages in Russia, 30,000/-; and sundry creditors, 18,000/-, while the assets amounted to 75,450/- So that if the thing were cleared up to-day, they had as many assets as would pay all the mortgages and all the liabilities, and have 450,000 acres of very magnificent property, costing them 300,000/-, an amount which he fully believed the property was worth, and would gradually increase in value. In the course of two or three years the railway now in course of construction would be completed, which could not fail to considerably enhance the value of the property.

A SHAREHOLDER: Why do you not take it back again at cost price?—The CHAIRMAN said his answer to that was this, that when everything had been done to damage property like this intelligence and patience must be exercised to establish a remunerative career, and the only thing required was prudent and proper management to make it yield profitable results. He then moved that the report and accounts be received and adopted.

The Right Hon. B. HEADLAM seconded the proposition, which was put and carried unanimously.

Mr. Mundella, M.P., was re-elected director. Mr. John Ball and Mr. James Glegg (of the firm of Messrs. Quiller, Ball, and Co.) were elected auditors.

A SHAREHOLDER asked when dividends were likely to be paid?—The CHAIRMAN said he could not answer that question.

The CHAIRMAN, in reply to further questions, said that when there had been much snow they were pretty sure of a good floating season, or much rain—as a rule, the people knew, and it could only be known by the people there. Those out must be guided by the circumstances at the time.

A SHAREHOLDER asked if the board still had faith in Capt. Rickard. The CHAIRMAN said he had faith in Capt. Rickard to a certain extent, and he knew how to check him. He thought he had been urged to do things he could not do, and had not the strength of mind to say he could not do them. There was now a very good English staff, and Capt. Rickard was a very excellent professional man—he was a good copper smelter and miner, and he (the Chairman) did not know where he could put his hand on a better. Each department had its controlling and responsible head. The railway had been concessioned for some time; the capital was offered for subscription during the earlier period of this year, and was subscribed for six times over; the work was now being got on with rapidly, and would be completed in two or three years. That would open up districts for labour in the neighbourhood of the Volga, bringing them into Orenburg, 28 miles from the mines, and would enable them to get a supply of labour from other districts. As to wood, seeing that wood was burned in their locomotives, and was used for every building, an immensely large and new consumption must be devoted for that article; the forests of their competitors were getting exhausted, and the price of wood was rising very much, so that when the railway was completed they would have a very large consumption. The experiments had been made of smelting ore with others that lie near the spot, which would form a very much cheaper product. Instead of the ordinary high furnace, the materials were put into a reverberatory furnace and the product smelted in a high furnace; almost any process would be better than to incur the cost of carting the ore from a distance. The said process had been tried, but without any practical results yet. They were investigating it, and they may have to put up works for the manufacture of sulphuric acid, but that would only be done after the matter had been very carefully enquired into, and the result justified the expense. It was wrong to suppose that a 3 per cent. ore would not pay. He knew where 1 per cent. paid, and 1½ per cent. paid very handsomely. The question of the proper treatment of the ore was now under consideration.

A proposition was made that proceedings be taken against the vendor to recover some part of the purchase-money.

The CHAIRMAN ruled that such a proposition could not be put.

Mr. CHESTER (a holder of two shares) moved that a vote of censure should be passed upon the directors for their policy with regard to the appointment of Mr. Brogden the vendor, as Chairman.

The CHAIRMAN said that a vote of that kind could not be put, as five days' notice was required. Besides this, the directors had the support of a large majority of the shareholders. Mr. Chester, as the holder of two shares, appeared here because the manager had refused to read to this meeting an offensive letter. Those who were present at the last meeting would recollect that he (the Chairman) had paid 18,000/- and 10,000/- to settle all questions that were in dispute as to the supply of stocks, &c., but not because he felt himself under any liability to do so. He did this, as the Chairman stated at the last meeting, for the purpose of putting the company into a more flourishing state, and he stipulated that he should be made a director, and upon that basis the arrangement had been carried out. He knew the concern to be a good one, and, knowing that, he was willing to make this concession, and the policy of placing him in that chair had been approved by the shareholders; therefore, feeling that confidence, he perfectly disregarded all that such people as Mr. Chester might say, who, holding very few shares, for the purpose of making disturbances to suit their own private ends.

The meeting then broke up.

TOLIMA MINING COMPANY.

A meeting of shareholders was held at the London Tavern, on Thursday, Mr. R. B. BARROW in the chair.

Mr. HOLMES (the secretary) read the notice calling the meeting, and the directors' report was taken as read.

The CHAIRMAN said: Gentlemen, the directors have laid before you what I hope will be considered a very lucid statement of the company's monetary transactions for the year ended in the month of May last; and, with their report, they have also circulated in *extenso* the reports of the general manager, the mining captain, and the underground agent. From the former you will be enabled to apprehend the financial results, and from the latter you will understand the workings of the mine, and the position of the property generally during that period. The information conveyed by those documents is so comprehensive and explicit that I am fairly entitled to use the stereotyped phrase that "they leave me very little to say to you;" but I am aware that many shareholders do not give that attention to such documents as they sometimes require, therefore I will ask your forbearance in making such observations as I deem necessary. In the first place, by way of anticipation of any enquiry on the subject, I wish to state to you that on the arrival of the correspondence from Colombia, full extracts are made of the returns and the workings of the mine, which are immediately published in the office, and also in such daily and weekly papers as will insert them free of expense. They generally appear in an abridged form in the *Daily News*, *Standard*, and *Daily Telegraph*, and they are fully reported in the *Mining Journal* and the *Mining World*, and that is the course pursued by many other mines, and therefore, if any shareholder lacks information the fault rests with himself and not with the board. If, however, any course can be suggested by which the information can be disseminated more extensively or more quickly amongst the shareholders we shall be glad to consider it. In the second place, I wish to say a few words as to holding the meetings half-yearly. I will remind you that our Articles of Association provide for general annual meetings only, and to make any alteration in the constitution of the company it will require a special general meeting, and afterwards a confirmatory meeting. Now, I will observe that the limited mining companies in this country having mines in Colombia (where our property is situated) hold their meetings only annually. I can name the Malpaso, the Rio, the Malabar, the Western Andes, and some others in the country. Then, again, companies here holding mines in California do the same—Sweetland Creek, Birdseye, and some others, hold their meetings only annually; and also in this country half-yearly meetings are the exceptions, I think, and not the rule. And you must bear in mind that the expenses of half-yearly meetings are a consideration; at the same time, I say on this point that if there is any general expression of opinion from the shareholders I am quite sure the directors will take it into their consideration. I have thought it necessary to remark upon those two points, and I hope my explanations will be satisfactory, because I know they have been mooted by some of the shareholders. Since the last half-yearly meeting, gentlemen, you will remember that Capt. Harper has been appointed to superintend the workings of the mine. I can assure you the directors felt very great satisfaction in engaging one so well qualified for the important position, and the special report made by Capt. Harper upon the Frias Mine, and circulated amongst the shareholders in June last, I think will give you confidence that we have an officer of great merit, and one in whom we can place the utmost confidence. I will now allude to the Frias Mine. The increased returns, and the improved prospects of the mine, are doubtless much more satisfactory than when we last met. The assay value of the ore, you will observe from our report for the

past year, amounts, in round numbers, to £171,000, as against £75,000 for the previous 12 months; and you will also observe by the accounts that, after striking off a deficit balance upon the profit and loss account, and after allowing above 1000/- for the depreciation of ore still to be realised, and after paying the dividends at the rate for the years 1872 and 1873 of 10 per cent. upon the A share capital of the company, the estimated balance upon the profit and loss account is shown in our favour to be about 5000/. This state of things, gentlemen, I think must be as gratifying to the shareholders as it is to the directors. With respect to the future prospects of this mine, I think they must be considered equally satisfactory. If you will turn to the several reports you will find that Mr. Welton, Capt. Harper, and Mr. Jones speak most encouragingly on this subject. There is one paragraph in Capt. Harper's report which I should like to draw your special attention to, for it not only shows how very careful Capt. Harper is in expressing his opinion, but I think also it requires an explanation. It is as to the reserves of ore, which is a very important point with us. He says—"It will probably be remarked that I have made no mention whatever of the reserves that are accumulating, nor put any value upon them; this needs explanation. It must, then, be borne in mind that our present mine is quite a new one, and that the courses of mineral at present being opened out, and which are giving the present returns, are all in new ground, the old Spanish workings come down to within a few feet of the 20 fm. level—there is, therefore, very little mineral here upwards, except a few old arches left by the Spaniards. All our ore ground, then, lies below the 20. Our engine-shaft is down 12 fathoms below this point, and at the 30 we have commenced driving levels east and west; all these are in good mineral ground, but until the 30 fm. levels are opened some distance upon and proved rich we cannot consider them as actual reserves, thus then, although daily laying open the reserve ground in our exploring stations, we cannot calculate upon them as actual reserves for some time to come; one thing is, however, certain, and that is should our mine continue to open out as at present, and as we have every reason to expect that it will from the indications presented, we shall soon be in a position of security, with a large amount of rich and valuable ore ground available to be taken away at any time, we shall thus be able to keep our returns regular, and even increase them if required; on the whole, I must say that our prospects are exceedingly encouraging." Perhaps I could exemplify Captain Harper's meaning by referring to that plan. This is the eastern part of the mine, called by Capt. Harper the new mine; here is the mountain where all the old Spanish workings are. And now we go the east, increasing the shaft spoken of, and it is now down below the 30, as Capt. Harper says most of the ore is taken away by the Spaniards down to the 20. The ore ground in this shaft has been for some time exceedingly rich, so much so that I suppose when Mr. Welton goes below the 20 he must have found Aladdin's lamp, for you will remember that at that time he returned £26,000 for one month. We have got down below the 30, and they are now driving east and west, and therefore Capt. Harper mentions that until these levels have been driven a certain distance he cannot say whether the reserves of ore can be here. In the 20, driving east and west, we have gone through very rich ground, and if in the 30 it also proves rich you may conclude it is rich between the 20 and 30. If it remains so, by this time next year the reserves, I suppose, will be valued at a very large amount. With respect to this shaft going down, Mr. Welton says that the engine-shaft is down 12 feet below the 30, and they are still sinking in a good course of mineral. This is in July, and that is the last report we have of the bottom working, as they had a slight accident to the machinery. He says, on September 1, with respect to this driving the 30 fm. east and west—"The 30 went east, is improved considerably; the lode has opened out, and is 6 ft. wide, with two branches of good mineral from 6 to 12 in. wide." He says—"The south-west, indeed, is not so rich, but begins to show signs of producing mineral in the 30." He says—"In the 20, north-east, a considerable change is taking place in the signs of the ground; strings of ore begin to appear all through the lode, which are indications that we are going into mineral ground." You will excuse me if that takes up your time, but it will give you some information. I do not know that I can say a great deal more of the Frias Mine, except to reiterate our confidence that we believe that with a more extended development the sanguine expectations we have formed of it will be realised. Perhaps I may say, as a pleasing circumstance to relate, that I see a gentleman here who interested himself in the mine, and he told me the other day that he went down the shaft and examined the workings at the 20 and 30 fathom levels; he was wearing a top coat, and when he re-ascended his coat was perfectly covered with silver, which were the lodes through which he went. Well, gentlemen, although I speak so favourably of the Frias Mine and its prospects, it is not my intention to paint everything *couleur de rose*, because I think I ought to say something on the other side of the picture, and I am bound to tell you that we have our difficulties and our drawbacks to sustain. Nor is it such plain sailing for our manager in Colombia as some of you may seem to imagine. The transit of ore for the last six months from the mine to the port of Honda has given Mr. Welton very great labour and trouble, and of course given much anxiety to the directors. The regular dispatch of ore is a most important point for this company, and I must trouble you once more to quote what Mr. Welton says on that point.

Notwithstanding that the Frias road is now in a better state than it has ever been in, the contractor has not been able to keep up with the increased produce of ore, and there is a balance of ore on account of past months of 165-54 tons lying at the mines; under these circumstances I am sorry to have to state that the contractor has just discontinued carrying on the plan that his mules are so worn out that they require rest, which is in a great measure true, but undoubtedly the high price now paid for mules and freight all over the country, and a desire to obtain more favourable terms from the company, was the principal motive. I had already obtained a new contractor, who carried 80 cargas of ore per month, and I am now purchasing mules to give to other men of experience in the business, and expect to have the carriage business arranged within a few weeks upon a much better system than hitherto. This question will, however, again become a source of trouble to the company, and if the mine produces a larger quantity of ore for export than at present, which is certain, the company will have to provide some means other than at present for the transport of ore from the mines to Honda, either an ordinary tramway or wire tramroad will have to be made from the mines to the plains."

Gentlemen, you will see that Mr. Welton refers to a wire tramway, but the directors are exceedingly anxious to postpone the consideration of the question until the Frias Mine is much more developed. I will read Mr. Welton's last letter—on Oct. 18—as to the carriage of ore—"On the 16th inst. Signor Arango arrived with 67 mules, making a total of 128 mules purchased on account of the company. These will be given to the contractors who have mules, and who offer to carry ours upon their own mules upon receiving a certain number of mules from the company, and by these means I anticipate obtaining the services of 200 mules carrying ore for us." Another source of anxiety and trouble to Mr. Welton is the excited state of the labour market; so many mines are opening up in the country that we have a difficulty in getting a sufficient number of peons to do the works at the Frias Mine. In the River Magdalena the water is sometimes so low that vessels cannot get to Honda to take the ore on board. Another difficulty is the difference between the assay value of the ore and the amount realised. Mr. Welton, I believe, is the most experienced assayer in the country, and he informs me he has always used the utmost diligence and the utmost care in assaying the ore, and therefore we can only hope and trust that in future the discrepancy will not be so serious. Then, again, the time occupied in this country in realising the ore is a question constantly before us. The ore is assigned to Messrs. Fruhling and Goschen, a firm of the highest respectability in this city; they have assayed us over and over again that no unnecessary delay takes place in the smelting of the ore. I wish you to understand that all these things which give the directors so much anxiety are, unfortunately, beyond our immediate supervision and controlling power, and therefore we have the greater difficulty in dealing with them. I will now, gentlemen, refer to our financial requirements. You will remember I stated to you at our last meeting that the vendors had consented to relinquish one moiety of the contingent purchase money of 20,000/. That arrangement, which received your sanction, has proved, I must say, most advantageous to the company; and let me here intercede to say that, in my humble opinion, our acknowledgments are due to the vendors for coming forward in the way they did, for had we not received that assistance we should not have our present bright prospects before us. I also stated to you that to erect the machinery at the Frias Mine, and develop it, and meet our liabilities, would require from 5000/- to 10,000/-; and we proposed to call up 5000/. In the first instance, and I may tell you that the whole of that call has been paid without a single arrear. The time has now arrived when the remaining 5000/- will be of very great advantage to the Tolima mining company. You are aware Capt. Harper urges upon us the absolute necessity of developing the Frias Mine in depth; certainly, if the present appearances continue, it will become, doubtless, a valuable and very lasting mine. I will tell you how the money will probably be spent. There is the machinery which we have just shipped and which cost 500/-, the erection of the machinery and the machinery we sent out two years ago will cost 2000. The erection of permanent works at Frias in 1874 and 1875, if we estimate it upon the scale of last year, will be 1500/. We must look to the additional mules which we have to purchase. I believe the cost of mules has risen now to 15/-, therefore the number purchased by Mr. Welton will come to nearly 2000. Therefore you see that we shall have to spend over 5000. That is the way in which we propose to spend the money. I have little to say to you about the Organos Mine, because the directors have carried out the wishes expressed by the shareholders at the last meeting by concentrating the works at the Frias Mine and the alluvial gold deposits. After the last meeting of Mr. Williamson's report on the mine was received, and it is well worthy of the perusal of the shareholders. It is too voluminous to publish, but any shareholder can see it. Mr. Williamson's opinion is that it is a most valuable mine, but to make it available three ingresses will be necessary, which I am sorry to say we do not possess, that is money, men, and management, and even the two first would be useless without the third, for good and faithful management is indispensable, especially in that country. With respect to the alluvial gold deposits you will find that the directors expressed, in their report, they think it advisable to wait the results of some of the hydraulic mining in the neighbourhood before coming to any conclusion, and I hope the results will be known in the next three or four months. I think there is abundant evidence and sufficient proof that we possess that which will come at no distant date a source of immense wealth to the company. Mr. Rogers, my co-director, has much more experience, and he will probably address a few words to you on this interesting subject. As to the general management in Colombia, we have, at Mr. Welton's request, taken steps to relieve him from those duties, and we hope to send out a well-qualified gentleman as his successor at a very early date. In observing that the auditors do not offer themselves for re-election, I merely beg to say that the directors are satisfied with the manager, in which they have performed their duties to the company; it is their own wish to retire, the pecuniary compensation, in their opinion, being inadequate to the services they render. There has been no notice sent for the appointment of any other auditors, and, therefore, before the next meeting it will rest with the directors to appoint two fit and proper persons as auditors to the company, and I am sure we shall appoint such auditors as will give you satisfaction. I now beg to move that the report and balance-sheet for the company's financial year ending May 31 last be and are hereby adopted and received. (Loud cheers.)—Mr. IRVING seconded the resolution.

Mr. ROGERS, in answer to a shareholder, said that possibly it might be advantageous to make a wire tramway in some of the more precipitous parts of the route, but it was a question which would require very careful consideration on the part of the directors. The resolution for the adoption of the report and accounts was put, and carried. The CHAIRMAN, in answer to Mr. Gray, said that after a dividend was paid on the A share any surplus which remained would be devoted to the payment of a dividend on the B shares. He might say that if a call were made it would be payable—5s. in March, and 5s. in June. The ore came direct to Swansea, and the charge of Messrs. Fruhling and Goschen for commission was 1 per cent. A SHAREHOLDER asked what amount it would take to wash the alluvial deposits?—Mr. ROGERS said that since the last meeting Mr. Welton had made a wonderful discovery upon the gravel. As regarded the supply of water, Mr. Welton had been making efforts to get a proper supply, and he believed that, with a con-

siderable expenditure, 1000 in. of water might be brought in. They would have to bring water four or five miles. There was no doubt that this discovery, when properly worked, would prove of the greatest benefit to the company.

The retiring directors, Mr. James Corbet Irving, and Mr. Charles Ogee Rogers, were then re-elected.

Mr. GEAL suggested that active steps should be taken to work the alluvial deposits, and

The CHAIRMAN said the directors were fully alive to the importance of the subject, and possibly before long would call a special meeting of the shareholders to devote it to consideration. (Cheers.)

On the motion of Mr. H. B. SHERIDAN, M.P., a cordial vote of thanks was passed to the Chairman and directors, and the meeting broke up.

BLUE TENT CONSOLIDATED HYDRAULIC GOLD MINES OF CALIFORNIA.

A special general meeting of shareholders is to be held on Monday.

The report from the superintendent states that it seems not inappropriate at this time (about the close of the first year of the existence of the company) to briefly allude to the condition in which he found the property when he assumed charge thereof. The magnitude of the undertaking to open up into the channel by bed-rock tunnels was well calculated to deter the owners of small sub-divisions, and from this cause began the process of consolidation of the numerous small ownerships never perfected until the whole, with one or two exceptions, was made over to this company. The immediate predecessors had expended large sums in the purchase and consolidation of claims and had commenced at one point—on the South Yuba claim, a well-conceived system of improvements, to open through the rim-rock at depth sufficient to ensure the reaching of the bottom dirt, or so-called blue lead, which by this time had been demonstrated to carry gold in largely remunerative quantities, whenever it could be opened at any reasonable cost of time and money; but their limited capital had proved inadequate, and at the time of the purchase by this company but little, if anything, was being done to develop or improve the property. It will, he thinks, be readily realised by all that so large a property held and operated heretofore in small parcels upon divers places, and often without any apparent plan, necessitated a radical change in the method of its management, and a complete remodelling and replacing of all the appliances for hydraulic washing, in order to carry forward with system and with profit future operations on a scale seemingly well warranted by its extent, durability, and proved value.

Took personal supervision of your affairs here about the middle of July, 1878, at the very close of the water season of that year, and at once began the work

FOREIGN MINING AND METALLURGY.

The aspect of the Belgian iron trade has become more sombre. No serious transactions have been reported, notwithstanding the concessions offered by the establishments which are the most in want of work. In Germany also the iron trade is suffering from considerable depression, and all hope of a serious revival in affairs is postponed to the end of the winter. Official tables which have appeared this week show that in October Belgium imported 61,396 tons of minerals, 9794 tons of rough pig, 167 tons of wire, and about 600 tons of iron of various descriptions. The aggregate imports of iron of various kinds into Belgium in the first ten months of this year amounted to 150,890 tons, or only 344 tons less than in the corresponding period of 1873. As regards the export movement relating to the Belgian iron trade, it may be observed that in October Belgium exported 14,742 tons of minerals, 1625 tons of rough pig, 277 tons of wire, 6626 tons of rails, 2558 tons of plates, 10,112 tons of rolled iron of various descriptions, 902 tons of rails, 1060 tons of worked iron, &c. The aggregate exports of iron and pig from Belgium in the first ten months of this year were 231,549 tons, against 191,493 tons in the corresponding period of 1873, and 243,170 tons in the corresponding period of 1872. As compared with the first ten months of 1873, the exports of pig presented this year a diminution of about 8000 tons; but, on the other hand, the exports of rails exhibited an increase of 19,529 tons, while the exports of plates expanded to the extent of 6657 tons. The exports of Belgian iron to England attained in the first ten months of this year the somewhat important aggregate of 30,382 tons, or about 20,000 tons more than in the corresponding period of 1873. Among the other best clients of Belgium for iron may be mentioned the Low Countries, which took in the first ten months of this year 34,000 tons. Italy, which took 32,000 tons; France, which took 39,700 tons; and the Zollverein, which took 22,000 tons; Russia took 16,800 tons; Switzerland, 10,000 tons; Turkey, 6288 tons; and Brazil, 6330 tons. The value of the iron and pig exported from Belgium in the first ten months of this year presented an augmentation of about 520,000 tons, as compared with the corresponding period of 1873. Some contracts for stores and plant are about to be let by the Administration of the Belgian State lines.

There has been a sensible hardening in quotations for copper during the last few days. At Paris, Chilian in bars, delivered at Havre, has made 92.; ditto, ordinary descriptions, 91.; ditto, in ingots, 97.; English tough-reak, 98.; and Corocoro minerals, pure standard, 92. per ton. At Havre, Chilian in bars has brought 90. to 93.; ditto, ordinary descriptions, 91.; ditto, in ingots, 96. to 97.; ditto, Lake Superior, 98. per ton. The quotation at Rotterdam for Drontheim has been 50 fl. to 52 fl.; and ditto, for Russian crown, 51 fl. The tin markets have not sensibly varied. At Paris, Banca, delivered at Havre or Paris, has brought 106.; Straits, delivered at Havre or Paris, 98.; and English, delivered at Havre or Rouen, 98. per ton. At Rotterdam, Banca has brought 58 fl.; and Billiton, 55 fl. The deliveries of Banca in Holland in the first eleven months of 1874 amounted to 131,876 blocks, against 183,008 blocks in the corresponding period of 1873, and 94,317 blocks in the corresponding period of 1872. The stock on schedules in Holland, Nov. 30, was 87,839 blocks, against 51,900 blocks in the corresponding period of 1873; the unsold stock of the Dutch Society of Commerce was also 79,135 blocks, against 27,932 blocks at the corresponding period of 1873. There has been but little change in lead and zinc; the two metals have been supported with firmness, a circumstance which is largely attributable to the scantiness of disposable supplies. At Marseilles rolled Vieille Montagne zinc has brought 32. per ton, with a discount of 3 per cent.

The French iron trade remains in a dull and lifeless condition. There is scarcely anything doing, and, consequently, nothing interesting to report. December is usually a quiet month in the French iron trade, and this is more than ordinarily the case this year. Official returns which have just appeared in illustration of the commerce of France for the first ten months of this year show that the imports of iron of various descriptions into France—and especially plates—have notably increased this year; on the other hand, the exports of iron of various kinds from France this year present a decline of somewhere about 19 per cent. The imports of iron minerals this year show an increase of 20,000 tons, the augmentation relating more particularly to minerals from the island of Elba. Quotations for iron remain generally the same upon the French markets, with a slightly downward tendency. The Pontgibaud Mines Company have been paying this week a dividend for 1873-74 at the rate of 2.4s. per share. The Epinac Collieries and Railway Company has also been paying this week a dividend for 1873-74 at the rate of 10% per share.

It is difficult to say anything interesting with respect to the Belgian coal trade. If prices are still maintained without variation, this is not done without some effort on the part of producers, as the requirements of consumption remain below the average, and some colliery proprietors, less privileged than others, are, it appears, disposed to propose a slight fall for January—a fall which would be accompanied by a reduction in the wages of working miners, after the example of what has been passing of late in England. The fêtes and the holidays at the close of the year, by stopping works of extraction, will allow stocks remaining at the pit's mouth to be disposed of. The commencement of January will bring with it either a continuation of present quotations, or a slight fall in those prices. As regards an advance in prices, there is no possibility of it. The imports of foreign coal into Belgium in October amounted to 55,137 tons, and those of the first ten months of this year to 341,586 tons, or 190,000 tons less than those of the corresponding period of 1873, and 180,000 tons more than those of the corresponding period of 1872. The exports of coal from Belgium in the first ten months of this year amounted to 3,205,681 tons, as compared with 3,582,750 tons in the corresponding period of 1873, and 3,911,182 tons in the corresponding period of 1872. The exports of coke from Belgium presented still less satisfactory results this year; thus, they amounted to 440,000 tons, against 700,000 tons in the corresponding period of 1873; a slight revival was, however, noted in the exports of November, as compared with November, 1873.

The French Minister of Public Works has published this week an official return, illustrating the production of mineral combustibles in France in the first half of this year. The total production of the six months is returned at 8,290,000 tons. In this total the basins of the Nord and the Pas-de-Calais figure for 2,800,000 tons; the basin of the Loire, 1,750,000 tons; the Alais basin, 850,000 tons; and the other basins combined together for 2,900,000 tons. Assuming that the production of the second half of this year is not inferior to that of the first half, it will be seen that the total production of the year will amount to 16,500,000 tons, or 16,600,000 tons. This latter total will about equal the production of 1873. The Nord and the Pas-de-Calais basins will probably, however, only produce 5,600,000 tons this year, while their production for 1873 amounted to 6,500,000 tons. The extraction of the new coal districts which have been opened out will make good the difference. It is expected that France will consume this year 6,000,000 tons more coal than she will produce; the department of the Nord has alone consumed one-third more coal than it has produced this year. The coalowners of the North of France appear, then, to have no just grounds for reducing a production which is, and which will long remain, insufficient. Whatever activity is given to the extraction the sale is assured with, perhaps, some slight sacrifices in prices. Notwithstanding cold weather, a slight fall in prices for domestic coal has for the time being prevailed upon the French markets. Industrial qualities have also been rather neglected.

COAL AND GOLD IN NEW SOUTH WALES.—The correspondent of the *Times*, writing from Sydney, says that coal is in the ascendant, and the affections of the speculators are transferred from gold. An important discovery of coal is made at Broughton Creek, near Shoalhaven river. A seam, 7 ft. in thickness, has been opened, and is not far from the railway station at Moss Vale. The following table exhibits an improvement in gold. It shows the Mint receipts of gold from the various gold fields only for the first eight months of 1873-74:—

	Western.	Southern.	Northern.
1873	...Ozs. 172,240	...34,464	...6,556
1874	...124,962	...27,655	...5,692

There is briskness about copper and tin mining, and more encouragement.

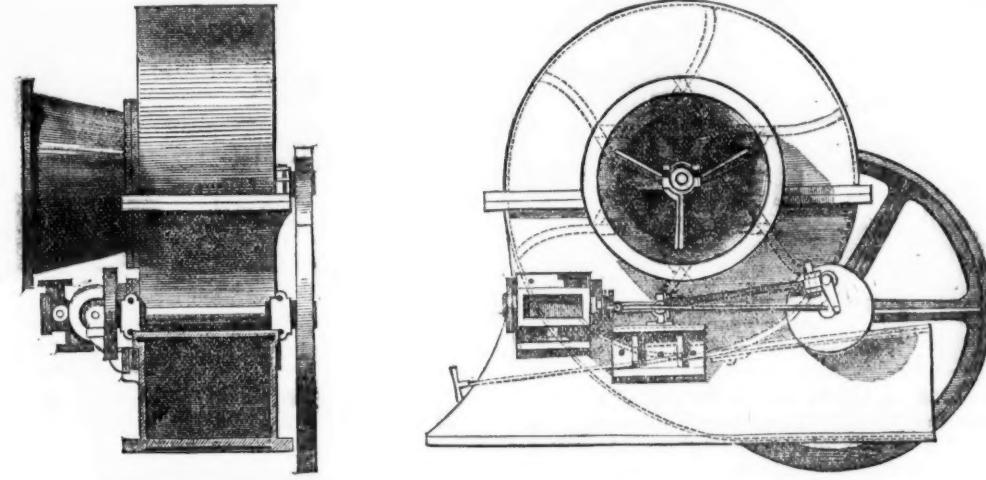
REVOLVING FURNACE FOR ROASTING ORES.

A new rotating furnace, the invention of Messrs. TEATS and BREED, of Cincinnati, Ohio, is at present being introduced in America for the roasting, desulphurising, chloridising, and oxydising of gold, silver, or other ores. It is built of light boiler iron, conical shaped ends, with cast-iron hollow throats, lined with common brick, laid flatwise. The furnace revolves on four adjustable wheels, as shown in the engraving, and is driven through a gear wheel secured in sections to the periphery of the furnace in such a way as to permit of its being removed and replaced without disturbing the brick lining. The driving pinion is on a counter shaft, on the other end of which are change gears, worked by a clutch moving on a feather; by this means the speed of the furnace can be changed from fast to slow, or it can be stopped by simply moving the handle of the clutch. At the front end of the furnace is a fire-box, 4 ft. long and 3 ft. wide, built of light iron, lined with brick, and arched with fire-brick. It is so constructed that it can be removed from the ash pit without disturbing its lining. At the back end of the furnace are dust chambers, built on pillars and in stories, so that the dust can be easily and quickly scraped down from one chamber to the other, and finally into the furnace, by means of a hoe. The interior of the furnace is provided with a sifting conveyor placed lengthwise with the furnace, composed of hollow cast-iron pipes and movable slotted plates fitted into the pipes in grooves. Each end of the furnace is provided with angle pieces, which, in connection with its conical shaped ends, assist in throwing the ore being roasted on to the conveyor, which moves it from end to end, thoroughly mixing and at the same time sifting it through the heated air. The conveyor, which forms the axis of the furnace, offers but slight obstruction to the free passage of the air currents. The furnace is charged through one or two doors, from a hopper resting on a beam scale for convenience in weighing. The ore is carried from the stamps to the hopper by means of a screw conveyor. Between the fire-box and the conical end of the furnace the throat is provided with a series of holes covered by a sliding ring.

By a movement of this the holes are opened, and such an additional amount of air is introduced as may be desired. Where the rear throat joins the flue to the dust chambers there is a hinged ring of cast-iron which, being opened, allows the removal of the furnace for repairs without displacing the masonry. Immediately above this ring is the revolving damper, which regulates the draft of the furnace. Under the arch in the rear is a door used to introduce salt or other material, and in taking sample tests from the furnace while in motion.

The furnace is heated with coal or wood, light wood being preferred. When hot it is charged and made to revolve slowly, so as to make as little dust as possible till the sulphur commences to burn, after which the speed may be increased to the maximum. After the sulphur is removed, or nearly so, if silver ores are under treatment, salt may be added, in quantity from 4 or 5 per cent. for low-grade ores, upwards. A few revolutions mix the salt thoroughly, after which the furnace should be run very slowly, and occasionally allowed to stand for several minutes till the ore is fully chloridised, which can be ascertained by test samples. A car is then run under the furnace, and the charge emptied into it in a few minutes by revolving the furnace rapidly. The furnace is then ready for another charge. The capacity of the furnace illustrated above is about 2 tons of gold or silver ore, and the charge is treated and the silver chloridised in from three to five hours. Some ores, containing a large percentage of zinc, lead, or other base metal, require as much as eight hours in chloridising. One man on each watch attends to the firing, charging and discharging of from five to eight furnaces, and one cord of wood per furnace for every 24 hours is sufficient in chloridising and roasting. The total weight of iron in each furnace, including hopper, dust chamber, plates, fire-box, &c., is about 7 tons, and it is stated in the "Mining and Scientific Press of San Francisco," wherein an illustrated description is given, that it is no more difficult or expensive to set up than ordinary machinery. It is claimed for the furnace that it is simple, and can be worked with less expense, and that it effects a greater saving of the precious metals at less cost than any other invention in use.

TEMPORARY VENTILATION OF MINES—PORTABLE GUIBAL FAN.



TEMPORARY VENTILATION OF MINES—PORTABLE GUIBAL FAN.

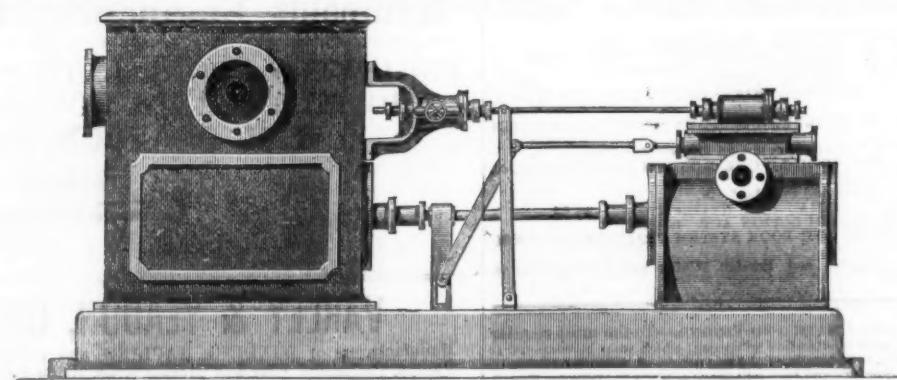
There are many cases in which the advantage of securing good ventilation temporarily and economically would be enormous, so that such a machine as the patent self-contained Guibal ventilator recently introduced by Mr. JAMES NELSON, of Sunderland, and Mr. D. P. MORISON, of Newcastle, and of which the above are diagrams, will, no doubt, be extensively appreciated and adopted. The new fan has six vanes, and revolves on a horizontal shaft, within a cylindrical metallic casing, by which it is completely enclosed at the sides and circumference, with the exception of a circular aperture in the centre of one side, for the entrance of the air from the mine or place to be ventilated, and an outlet opening in the circumference, for the discharge of the air into the outlet chimney. The area of the outlet opening is regulated by an adjustable sliding shutter, according to the extent of ventilation required, and the outlet chimney is so constructed that it gradually increases as it leaves the fan, so as to reduce the velocity of the air at the point of discharge, and thereby prevent the loss of power that would occur in discharging it at the velocity of the fan. The outlet chimney forms the greater portion of the bed-plate of the ventilator, the remaining portion consisting of angle-iron of suitable form. Between one portion of the circumference of the fan-cylinder and the outlet chimney there is a short transverse shaft, carrying the wheel, which acts both as fly-wheel and driving-wheel, and is driven by a small horizontal engine, fixed by a wall-plate to the opposite side of the fan-cylinder. The necessary tubing being laid to connect the place to be ventilated with the inlet opening of the fan, the whole is ready for work.

With regard to the power of these portable fans, it is found a ventilator 2 ft. 6 in. in diameter and 12 in. wide, with its 3-in. cylinder, will deliver from 5000 to 10,000 cubic feet of air per minute according to the condition under which it is working; the next size, 4 ft. diameter and 18 in. wide, which has a 6-in. cylinder engine, delivers from 7500 to 15,000 cubic feet per minute; and the

still larger ventilator, 5 ft. diameter and 2 ft. wide, worked by a 9-in. cylinder engine, gives from 10,000 to 25,000 cubic feet per minute. It will be seen that the engine and gearing are combined, and that the ventilator is self-contained and requires no fixing, erecting, nor brickwork; it is, therefore, applicable to a vast number of useful purposes. Being portable they will prove most valuable adjuncts to any mine, as they can be moved to any shaft, drift, or district workings, and can be driven by water, compressed air, tail rope, or steam. Where large volumes of air are permanently required, the useful effect is better from ventilators of larger dimensions, and small quick running fans cannot compete with them in duty. These are specially manufactured and designed for places where the ventilation is light, or where a temporary current is needed, either separately or in conjunction with other ventilating mediums. It is available either for exhausting or propelling air; and, applied with air-tubes or other brat ticing, is of the greatest utility in sinking shafts, driving headings, or as an auxiliary to existing means of ventilation in any distant or separate part of the workings.

As about 150 of the Guibal ventilators are in operation, or in course of construction—one of them 36 ft. diameter and 12 ft. wide, worked at 44 revolutions per minute, yielding 243,770 cubic of air, water-gauge 1.9, and guaranteed for 3.6 water-gauge, with 60 revolutions per minute—the general character of the Guibal ventilator must be well understood; but it may be mentioned that experience has proved that it requires but very few repairs, and does excellent work, whilst the total cost of the fan, with engine and connections, is only about one-third that of an ordinary ventilating furnace for producing the same amount of ventilation. A comparison of actual working between the furnace and the fan at a colliery in the North of England showed that with a consumption of only two-thirds as much coal the fan supplies nearly double the amount of air obtained with the ventilating furnace. No direct experiments seem to have been yet made with the portable ventilator, but there is no reason to suppose that the results obtained with it will be less satisfactory than those which have been given by the larger machines on the same principle.

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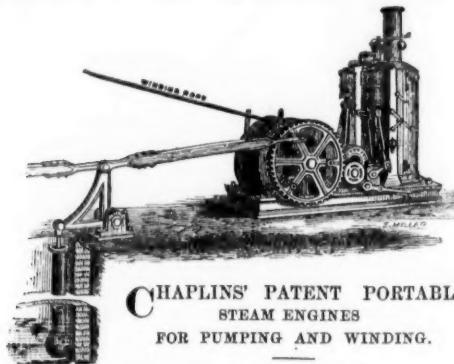
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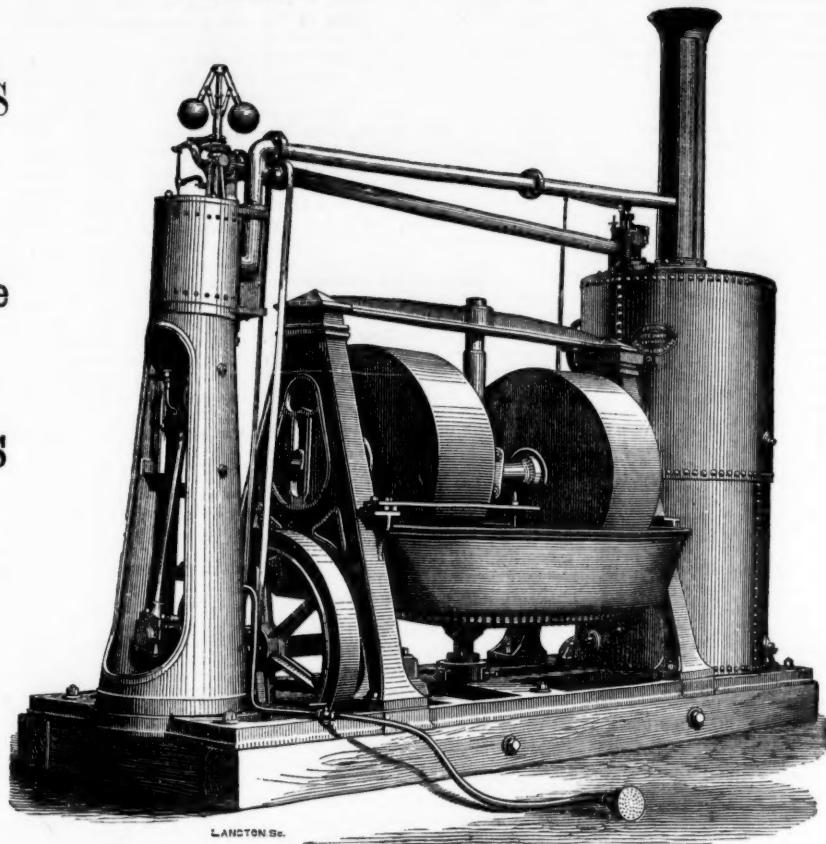
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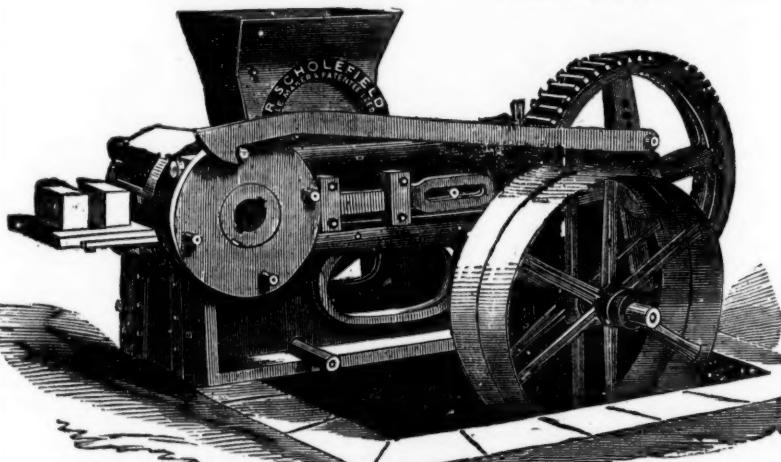
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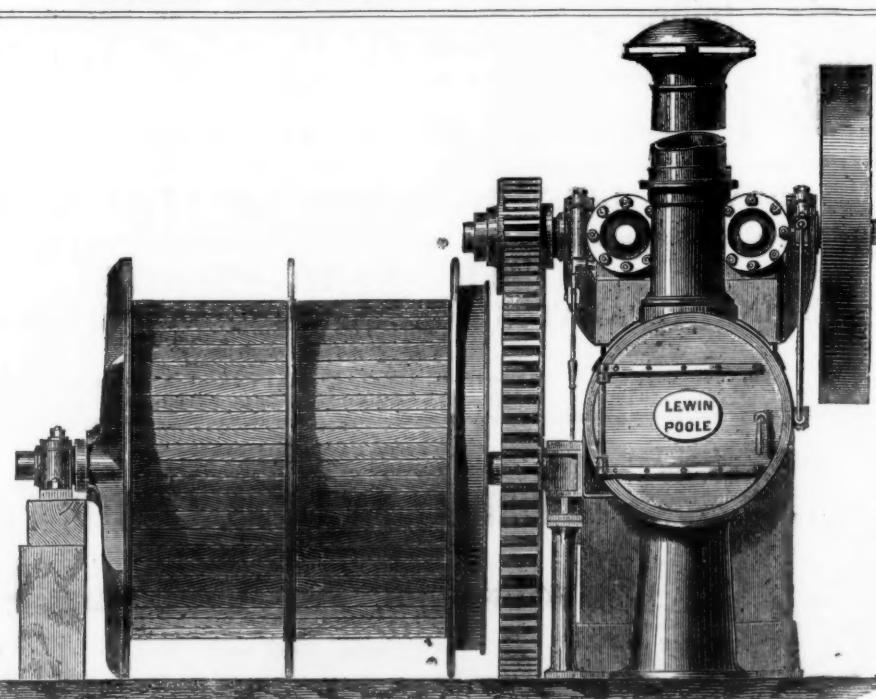
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